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VOLUME 33 NUMBER 10

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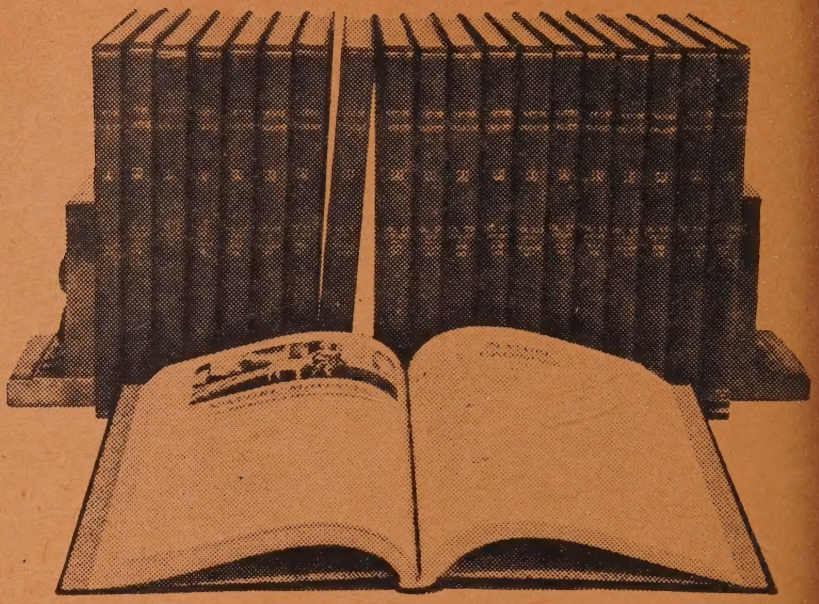

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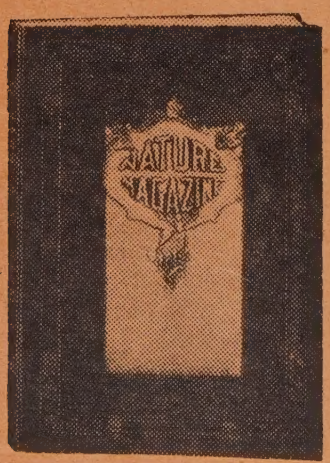

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ON THE RECORD

Cut in prices of Victor records has made e large Victor catalog a sort of best seller nong music lovers. Budgets and bank bal-ces are a problem with most of us, but it now possible to make the dollar go farther adding to one's disc department. Classified d cross-indexed, the catalog will reveal any items of classical and specialized re-rdings of permanent value. There is a nsiderable collection of records of interest those interested in Nature and the outdoors.

The Junior Programs Opera Company, nder the direction of Saul Lancourt, has corded the traditional story of Robin Hood a three-record set. The musical story is nbellished with music based upon old nglish airs and madrigals. This set is listed Victor Album No. P-35. Another similar t of interest to the younger music lovers the Victor Orchestra's recording of Hänsel d Gretel. Under the direction of Nathaniel ilkret, the orchestra presents the high spots Humperdinck's opera. This is a four-cord set listed as P-38.

To add to the list of popular recordings songs that have received their inspiration om Nature we have "A Brown Bird Sing-g" (B-10850). This is an old standby corded by Larry Clinton's orchestra, with calizing by Terry Allen. On the other side Tschaikowsky's "Dance of the Candy ity", done with a mild swing tempo. An-her is Perry's "Warbler's Serenade", long a pular favorite and now recorded by the ndon Palladium Orchestra on Victor cord 26669.

On a recent tour of the British Isles B.—Before Blitzkrieg) John McCormack atured two lovely Irish airs—"The Cloths Heaven" and "Cradle Song". The first is m the great Irish poet, Yeats, and Pa-ic Colum wrote the latter. They are re-rded on Victor Record 26705, with piano ompaniment by Edwin Schneider.

Marie Houston, soprano, effectively evokes Elizabethan atmosphere in an album of ngs from Shakespeare's Plays". These clude "Willow, Willow", "The Airs Sung Ophelia", "Farewell Dear Love", "Where Bee Sucks, There Suck I", "She Never ld Her Love", "If Music Be the Food of ve, Play On", and others. Accompanied by rpsichord, piano and flute, these songs nprise the cream of the melodies inspired the lines of Avon's bard. A booklet goes th the album (Victor Album P-39) to give ts and brief comments on the various nposers.

"The 500 Hats of Bartholomew Cubbins" a delightful set of three discs presented in attractive envelope. On these records, Paul ing, with the aid of music and sound ef-s, tells of the tribulations of a little boy o was sent to market with a basket of nberries to sell. He encounters his ruler, wrathful king, and every time he doffs hat, while paying his humble respects, ther hat appears on his head. The 500th l last, however, is a miracle of jewels, velvet and feathers, and so entrances the king that he buys it from the boy with 500 pieces of gold. All this solves Bartholomew's problems and is grand fun. (Victor Records B-564 to B-566)

Making a preliminary survey of Christmas desires around the house, we interrogated the junior-high-school-age daughter. We were prepared for almost anything, but she reeled off a list of records—and a pair of figure skates. We think she has an idea that would solve the Christmas gift problem for many of the younger set.

Silver Anniversary

The September, 1940, issue of *The Migrant* celebrates the silver anniversary of the Tennessee Ornithological Society, of which this always interesting little quarterly is the official publication. On October 7, 1915, five "bird men" in Nashville met and organized this group, and from this first meeting has grown an active society of naturalists and conservationists with chapters in several Tennessee cities. The membership may well be proud of *The Migrant*. With its ornithological information attractively presented, it is a publication that should be saved in one's files for it makes contributions of lasting value.

Being Host to Birds

Choice of bird feeders, bird food and bird houses cannot be a hit or miss matter if it is to bring about the best results. Birds know what they like and these avian preferences have to be considered in choosing the most appropriate things to attract them. In fact, attracting birds to one's home grounds has many important and interesting quirks that make success a fascinating and entertaining hobby, besides helping the birds. To readers who wish help in selecting this sort of material the American Nature Association will be glad to send a booklet entitled "Bird Houses and Feeders."

Exchange

Fred Easter, Box 22, Station F, Cincinnati, Ohio, has made a special study of coniferous trees and has built up a collection of pine cones. He would like to correspond with others similarly interested and to exchange specimens. He'd also be glad to answer questions with respect to identification of evergreens.

Watering Gauge

A practical, but inexpensive watering gauge has just been developed that accurately indicates, on a graduated dial, the moisture condition in the soil of pot plants. It shows the moisture situation at the level of the roots and thus eliminates all guesswork in watering. A three and one-half inch perforated aluminum prong penetrates the soil, and encased in it is a strip of moisture-sensitive material that, by contraction or expansion, causes an indicator on the dial to register degrees of dryness or wetness. A chart, on which the gauge is mounted, classifies house plants into three groups according to their need for moisture.

Becomes Correspondent For Two Newspapers

"After graduating from N.I.A., I became news correspondent for the New Orleans States and the morning paper, the Times-Picayune. I received top space rates from both papers. I have already netted $175.57 and proved by actual experience that N.I.A. instruction is astoundingly efficient and accurate in charting the course of aspiring writers."—Mrs. D. B. Turnbull, 1914 Esplanade Ave., New Orleans, La.

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If the latter course is the one of your choosing, you probably *never will write*. Lawyers must be law clerks Doctors must be internes. Engineers must be draftsmen. We all know that, in our times, the egg does come before the chicken.

It is seldom that anyone becomes a writer until he (or she) has been writing for some time. That is why so many authors and writers spring up out of the newspaper business. The day-to-day necessity of writing—of gathering material about which to write—develops their talent, their insight, their background and their confidence as nothing else could.

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Camera Trails

BY NORRIS W. HARKNESS

Lighting

The next time you see a photograph of exceptional depth and that seems almost to be three dimensional notice the direction of the light that was used to make it. In practically every case you will find that it comes from one side rather than from behind the camera. This is a fact to keep in mind in all kinds of picture making.

With the flat lighting, as it is called, that comes from having the light too nearly parallel to the line of sight of the camera, there are few shadows that the camera can see, and the resulting picture seems to be almost entirely in one plane with no distinct tones of light and dark to differentiate between the objects at various distances, or even between the front and back planes of each single element in the picture area. Since each object seems shallow, and there is little to separate one from another, the whole picture lacks depth and, therefore, strength.

With side lighting, on the other hand, the front of each tree or stone has a definitely different tone from that of the two sides, and each of them is unlike the other. One side is most brilliantly lighted while the other is the darkest part of the object, and the front is a half tone somewhere between the two. The result is a figure that has roundness and thickness as it appeared to you when you saw the actual scene.

The same thing applies to the separation between adjacent objects. The front of each one is slightly differently illuminated from that of the next, and the front of the one behind is quite different from the edge of things before it. Each object, then, is thick in itself and each one is truly separated from its neighbor, and the print has the real depth that stamps it as a good picture.

PRIZE PICTURES. "EXPECTANT MOTHER". NODDY TERN ON NEST BY DR. J. S. MCKENZIE, JR., MIAMI, FLORIDA. "A FOXY FELLOW" BY R. E. HART, CLEARWATER, FLORIDA

This need for side lighting is apparent in any kind of picture, but especially so in Nature photography. A Nature picture is not only an attractive print that gives esthetic pleasure; it is also and just as necessarily so perfect a reproduction of the plant or animal that it may be studied to discover exactly what the subject really looks like and how its various parts are put together or held in normal position. To be so true to life, the pose must be right and the lighting must be so arranged that the figure has depth and relief. Its different planes must be clearly visible and sharply defined, and so separated from each other that we may be sure of the relative placement of the different parts. To make them stand out properly is almost impossible with flat lighting that casts none of the tiny shadows that indicate the different planes, but the side lighting shows plainly whether one part is before or behind the one near it. The same graduated lights that you found on the tree trunk give the third dimension to each of the parts of the figure, and you have caught the depth and reality that is wanted.

So side lighting is far better than any other for Nature pictures, but this does not mean that all the light can come from the one direction. There must be enough light on the darker side to record every detail in even the deepest shadow. In daylight out of doors the sun supplies the direct light and the reflection from the bright sky illuminates the

dow areas, but it sometimes happens that reflected light is too much less than the ect to keep the brightness range within latitude of the film. In other words, in h a case the contrast of the lighting of the ject is so extreme that you cannot record shadow detail without over-exposing the hlights. If your setup seems to be lighted evenly, an additional reflector is called for, some light-colored object should be held the darker side to reflect light into the dows. A white card is good but you prob- y will not have one with you in the field, have some member of the party hold a ndkerchief or a sheet of paper near the rk sections and turn it until they are lighter. member that the farther away from the ject the reflector is placed the larger it eds to be, and remember, too, that the effect m the camera is the important thing to tch.

But all this holds primarily for black and ite pictures. Color shots do not require much side lighting to have the desired pth, and really are better when lighted re flatly. The colors of the different areas pply enough depth to give the picture its turalness so the more contrasty lighting ll add only slightly to the effect while caus- g the danger of incorrect color rendering introducing too much difference in light ensity between highlights and shadows. e color film cannot handle satisfactorily as de a light range as black and white film, d thus demands a more uniform lighting e the flat light supplied by having the urce behind the camera. If the position of e subject makes it impossible to shoot with ch a light and you have to resort to a re- ctor to reduce the highlight-shadow differ- ce, do not forget that the reflector's color ll show even though it cannot itself be seen the picture area. The green tint in a girl's nde hair is caused by the light reflected m the tree under which she stood when u made the exposure, and the same thing y happen if the reflector you use to shine t into the shadows has a color of its own. It is not always possible to get the light where you want it and it is far better to the shot in a less perfect lighting than to make it at all, but keep this funda- ental in mind and use it whenever you —have the light from the side for black white work and behind you for color ts. It is an easy way to improve your pic- es.

This and That

It is not too late, if you start now, to make ur photographic Christmas cards. Your aler is showing at least one kind of kit t includes masks and lettering negatives th various messages that you can combine th your favorite negative to make an in- vidual card that your friends can receive m no one but you. It is work to make y or a hundred prints from the same set negatives, but the resulting card—if you rk carefully and do your best possible— ll be more than worth the effort. Probably meone will want to keep your card for a g time, so be sure to fix them in accord- ce with the directions furnished by the ker of the fixing bath and to wash them roughly.

Then, when Christmas comes, remember trouble you had in finding the exact neg- ve for this year's cards and get busy on a better one for those you will make in 1941. In these days almost any kind of picture is found on the season's cards, but what Grandmother called a "Chrismassy" picture is bound to be more appropriate and more appreciated, so make sure that you will have just the right one next year.

The Solar Enlarger is a splendid machine. I have been using one for several weeks and recommend it to any photographer for practically any kind of work. I have been making copies and tabletop pictures with it, and a few days ago I used it as a projector to demonstrate the Stereo-Jector (see below) in my dark-room. For details of the Solar and the catalog of the Watson Camera and the other Burke and James products, as well as a short but valuable outline of many of the photographic processes, write to this department for the booklet "Better Pictures". It is priced at 50 cents but will be sent free to Camera Trailers for a limited time.

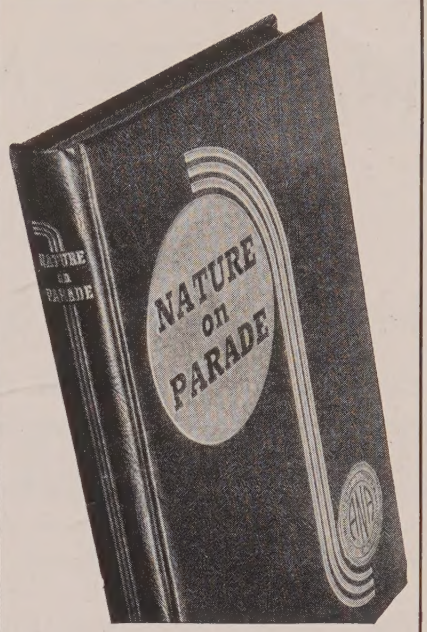
The Fink-Roselieve Hi-Spot is a small spotlight that uses a concentrated filament bulb and has a Fresnel lens. I have been using it for portraits and the usual spotlight work and like it. If you write to Fink-Roselieve Company at 109 West 64th Street, New York, and mention this department, you will receive the details of the Hi-Spot and a copy of the booklet "Lighting Glamour Shots" by John Hutchins. Be sure to mention NATURE MAGAZINE and to ask for both the booklet and the information you want.

The Stereo-Jector is the projection end of the Stereo-Tach I mentioned some time ago in these columns. If you do not remember, the Stereo-Tach is a mirror device you slip on the lens of your small camera to make stereo pictures in one shot. The Stereo-Jector consists of a special lens that fits your present 2″ x 2″ projector and throws the two stereo images on a metallic screen. Seen through polarized glasses, the picture is fully three dimensional, and is startling if the shot was made in color. For full information write to Advertising Displays, Inc., 12th and Banklick Streets, Covington, Kentucky, and mention this department.

Eastman Kodak has issued more of their justly famous Kodaguides, the cards that sell for ten cents and are invaluable. Two of the new ones are especially worth while, the Kodachrome Outdoor Guide and the Paper Kodaguide. "Picture Taking Outdoors" is a small booklet—also at 10c—that contains most of the information you need regardless of the camera you use. Still another recent bargain that looks silly, but most certainly is anything but that, is the Handy Measure—still the same price—that is nothing more than three cards tied to a piece of cord. When your intended portrait victim holds one card at his face, the others show the proper distance for the lights and the less expensive cameras. It sounds too simple for the advanced photographer, but even he will find it most helpful, and the less experienced worker cannot afford to be without it.

For more than a few years I have been trying to find the camera I could unhesitating-

(Continued on page 603)



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NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C., U. S. A., and accepted for mailing purposes at the special flat rate of postage provided for in the United States Postal Act of October 3rd, 1917, and February 28th, 1925. Additional entry at Greenwich, Conn. $3.00 a year; foreign $3.75.

Publication and Editorial Office, 1214 16th Street, N. W., Washington, D. C. Additional Office of Publication, Greenwich, Conn.

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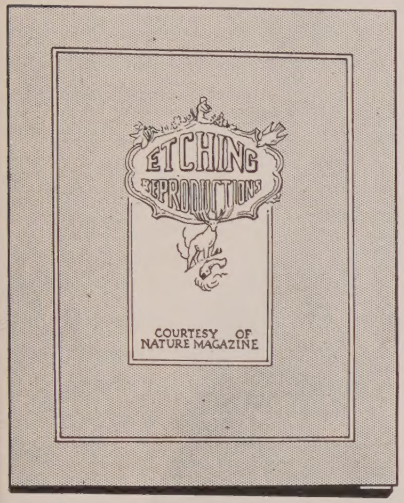

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Foresters to Meet

The fortieth annual meeting of the Society of American Foresters will be held in Washington, D. C., December 19 to 21. It will bring together many of the 4600 technically-educated foresters who are members of the Society. Most of the sessions, at which discussions of many important forestry subjects will be held, are open to the public.

Our Mistake

We regret the necessity of pointing out a serious error involving the first illustration and its caption on page 460 of the October issue. The plant is a form of evening primrose, *Oenothera missourienses*. In the process of making up these pages, the evening primrose picture was put in the place of the one intended, and the error was not detected until it was too late to rectify it. Needless to say, the two plants have no characteristics in common.

Humane Trap Contest

The American Humane Association, 135 Washington Avenue, Albany, New York, announces its fourteenth annual humane trap contest designed to stimulate the invention and development of traps that will take animals alive and unhurt, will hold trapped animals without injury, or will kill humanely. Prizes are awarded in several groups and there are special state awards in several cases. The contest closes April 30, 1941. For information and entry forms write to the Wild Life Department of the Association.

Harwell Leaves Yosemite

For eleven years Charles Albert Harwell has served as park naturalist at Yosemite National Park, and has thus informed and entertained many thousands of visitors to that area. Ornithologist, conservationist, lecturer, Mr. Harwell will be missed from his National Park post, from which he has resigned to take charge of the California office of the National Audubon Society.

Catbird Oddity

There are observations reported of young birds of a first brood remaining in the family circle and aiding in feeding the young of a second brood, but we do not recall a report of a brother or sister also aiding in brooding the eggs of its younger avian brothers and sisters. We are indebted to Paul Griswold Huston of the faculty of The Bolles School of Jacksonville, Florida, for such a record. At his summer home in Berlin, Connecticut, a pair of catbirds nested in a lilac bush, rearing a first brood successfully. One of the young, however, whose tail feathers developed slowly, stayed with the parents. In mid-summer the old birds built a new nest in an apple tree near the kitchen door. "The young bird of the first brood," writes Mr. Huston, "came at once upon a certain call from the mother to relieve her and sit on the eggs for half an hour or so while she had a dust bath and a meal. Later on, when the second brood was hatched, the same younger bird, its tail feathers now much better, did its part in helping to feed the new birds."

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Nature in Print

By HOWARD ZAHNISER

DURING a December blizzard, twelve miles northwest of Boston, a few years ago, a black-capped chickadee attracted the attention of one whose "unhealthy and o'er-darkened ways" had so deepened the gloom that her living was surely in "spite of despondence." Domestic difficulties, the tragic death of two infant daughters, and a painful injury followed by arthritis in hip and spine had crushed her spiritual and physical suffering into bitterness. Perhaps she had not read, or kept in mind, the assurance of John Keats a century ago that—

in spite of all,
Some shape of beauty moves away the pall
From our dark spirits.

Yet the chickadee outside the windowpane was that "shape of beauty;" and, as Keats had said, it was not to be felt merely for one short moment but was to become one of those essential influences that—

Haunt us till they become a cheering light
Unto our souls.

That chickadee in the snow and sleet, with "jaunty black cap pulled low over his eyes and black muffler knotted snugly under his chin," was indeed destined to be "a joy forever," not only to Ada Clapham Govan but also to an increasing number of others who have read, or will read, her writings.* That very night it brought to her the promised refreshment and rest of—

a sleep
Full of sweet dreams, and health, and quiet breathing.

"I went to bed that night," she writes, "in happy anticipation of something wonderful about to happen, and wakened to a new day refreshed by my first restful sleep in months."

There is no doubt now that something certainly was about to happen. Admiring the courage of that chickadee in the storm, Mrs. Govan had compassionately managed to drag herself in some pain to the door with a handful of crumbs. Other birds returned for more crumbs, and the next morning, when she hurried to the window, forgetting "to be careful of joints grown stiff over night," she found the anticipated flock of birds waiting for her kindness. She "who had been nearly helpless, had been able to give help." Soon about thirty birds were waiting for her daily, and as her interest in the birds grew, her own courage increased, her spirits brightened, and illness became convalescence. It is no wonder that Mrs. Govan now declares that the first chickadee "was the tiny gallant leader of the feathered host that was to make life over for me."

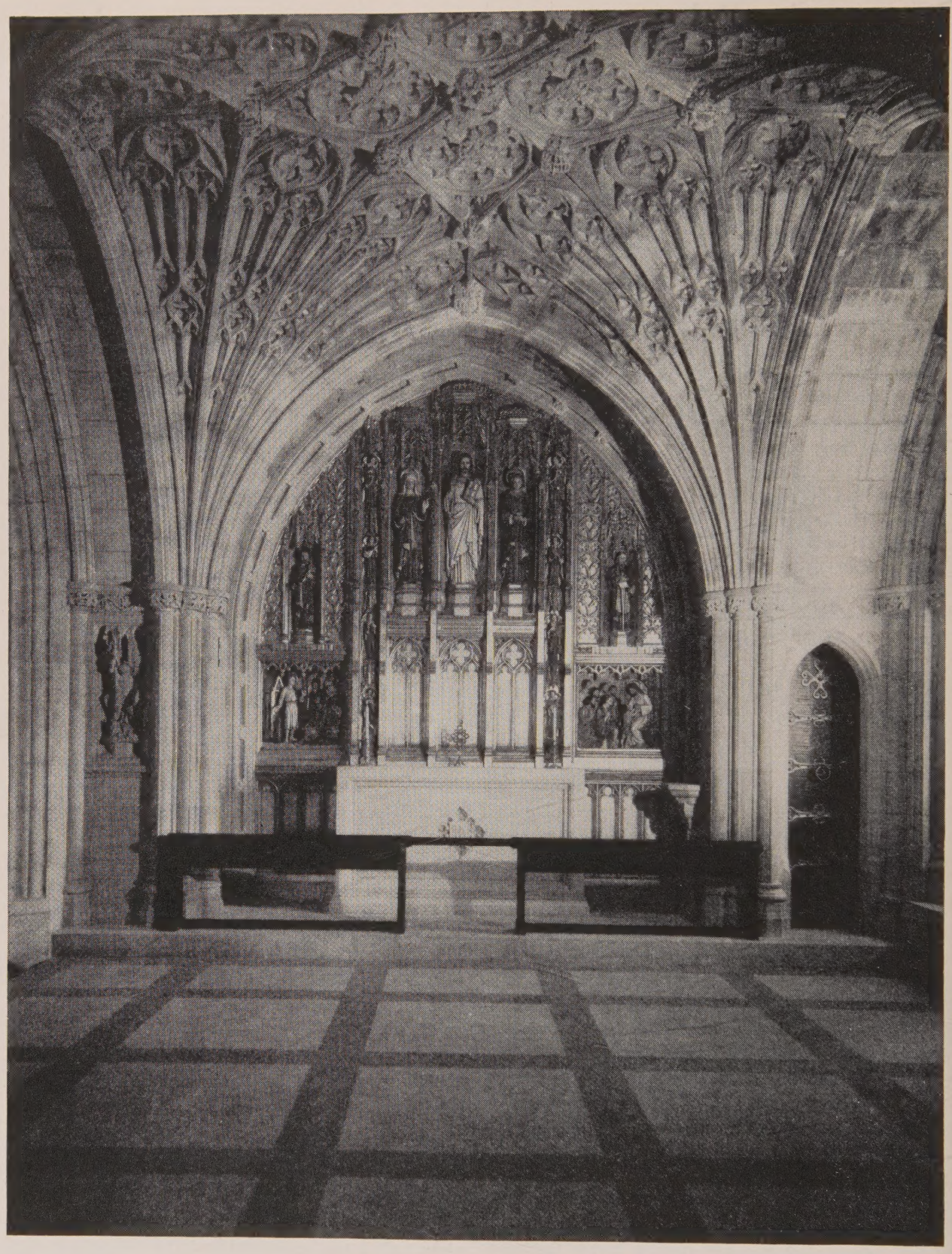
Mrs. Govan's intensive bird-feeding activity that soon developed is in itself a notable thing. Within a year she who had never before taken any special interest in birds had observed eighty-nine species outside her own window. In twelve months she had used four hundred pounds of wild-bird seed, a hundred pounds of sunflower seed, twenty-five pounds of chick-feed, twenty-five pounds of hemp, and twenty-five pounds of millet, besides beef and lamb bones, bread crumbs, table scraps, raisins, currants, peanut butter, pie crust, doughnuts, cake, and "plenty of suet!" Feeding the birds had become almost her chief concern. "My husband," she says, "still remembers the morning he poured cream on a dish of bird seed while I . . . absent-mindedly tossed his grapenuts to an indignant flock of purple finches waiting for their breakfast."

A message of "Sanctuary," was soon carried to all the birds of the neighborhood, even including the English sparrows. "Better kill them," some advised, but Mrs. Govan replied, with a grand humility, "I am not trying to run the universe. I'm only trying to feed the birds who come to me." They all came, in such numbers that even experts in the knowledge of birds were attracted from a distance to observe such sights as large flocks of siskins, and study groups made an observatory of her home. With the help of her young son Mrs. Govan later established a bird-banding station. In the first twenty-six days of her own banding work, she banded a hundred and sixty-seven birds and became convinced that "bird banding makes anything but a daily personal contact with birds seem flat, stale, and unprofitable." Over a six-year period she banded, besides other birds, considerably more than a tenth of all the rose-breasted grosbeaks banded in all the country. On intimate terms with her guests, she enjoyed such rare privileges as that of observing the courtship dance of purple finches. Through all these experiences Mrs. Govan became something of an authority on birds about the home, and her suggestions are of the first order whether they deal with what and how to feed, with banding, with care of injured birds, or with how to handle the problems that come with cats, hawks, and shrikes.

It was inevitable that Mrs. Govan's story should be told far and wide and eventually reach the printed page. It is a general good fortune, however, that this should come about through her own writings, and as apparently in all her experiences this good fortune followed personal hardships. Unemployment in the home brought economic difficulties, and in desperation Mrs. Govan, who had previously written only letters to the woman's page of a newspaper, determined to become a writer. In less than seven weeks she sold eight articles, all having, as she believed, only one virtue—"the sincerity of absolute truth." Once engaged in writing, her pecuniary motives naturally were given only a due consideration. "The compelling force that drove me," she now realizes, "was not so much our desperate need of dollars as my eagerness to make others see my birds—all birds—through my eyes."

There could, of course, be no better motivation for good writing, and Mrs. Govan's gift of expression has added all that was needed to make worthwhile literature out of the accounts of her own experiences (Continued on page 605)

**Wings at My Window.* By Ada Clapham Govan. New York: The Macmillan Company. 1940. 216 pp., with foreword by Richard Wilbur Westwood and illustrations by Dorothy Bayley. $2.50.



IN DEDICATING THE CHILDREN'S CHAPEL IN THE NATIONAL CATHEDRAL IN WASHINGTON, THE BISHOP OF WASHINGTON SAID THAT IT "ATTESTS TO THE GREAT TRUTH THAT THE SPIRIT OF THE CHILD MUST COME BACK TO THIS DISTRAUGHT, DISORDERED WORLD BEFORE REAL PEACE MAY BE KNOWN"

NATURE MAGAZINE
VOLUME 33 · DECEMBER · 1940 · NUMBER 10

"Suffer Little Children..."

Nature is present in the Children's Chapel

By MAUD MACDONALD HUTCHESON

"SUFFER little children to come unto Me", pleaded the Master, but it has taken nineteen centuries to draw from the divine injunction its deepest meaning. The worship by children as a separate function of Christian service is an idea that grew out of the last war. As the four dreadful years wore on, the chantry chapels of England's lovely old cathedrals became sacred to private devotion. These small chapels—which derive their name from the French "chanter", to sing—had been built within the larger walls as memorials, and there the priest had originally intoned regular services.

Between 1914 and 1918 they were given over to intercessory prayer—mainly for loved ones on active service. Children, it was noticed, often found their way in alone. Sometimes they laid a few flowers on the altar, or they joined older kneeling figures for a few moments before stealing out.

After the Armistice the Dean of Chester's 1000-year-old cathedral made the significant move of setting off a "Corner" for the sole use of children, making them responsible for its upkeep. The Corner contained a prayer desk, chairs, a table, and books and pictures suitable for children.

The idea spread throughout the British Empire and churches and cathedrals began to set apart corners and arches where children could come alone. It has been given, however, to the magnificent cathedral, now in course of erection in Washington, D. C., to include a Children's Chapel as a distinct unit of the structure. This beautiful little place for little people is thus not an afterthought. It was conceived as a concrete expression of the love Christ bore to children, and its construction has been carried out with a deep understanding of the young heart.

ST. MICHAEL—THE CHILD'S GUARDIAN ANGEL

Fitting in the form of a Greek Cross into the intersection of the Choir and South Transept, it is the memorial of Mr. and Mrs. Roland L. Taylor of Philadelphia to their six-year-old son. The dedicatory inscription reads: "To the Glory of God and in loving memory of Roland Leslie Taylor—1905-1911. Of such is the kingdom of heaven."

Inscribed in pierced lettering on the cresting bar above the iron entrance gates are the familiar words, "Suffer little children to come unto Me." To add "And forbid them not" would not be a fiction in this instance, for the tradition has already been established that the gates of this children's church will always stand open to them. The lock is a concealed one, and the key is in the keeping of the Dean.

Everything is on a miniature scale. The organ is "pocket-size", the chairs are tiny, with small cushions ranged before them for kneeling, in accordance with episcopal usage. A sense of the great outdoors pervades

the place and gives it an air of spaciousness, for the world of Nature, with its wealth of symbolism, is the basis of the exquisite carving on walls and ceiling. The same motif appears on the massive iron grilles that enclose the chapel without shutting it off from the cathedral proper.

The iron gate that leads into the little sanctuary has a bird-handle. Fashioned head-downwards, it nestles warmly into a small hand. Birds, animals and flowers make the Children's Chapel their abiding place, for they have been sculptured into the stone and iron. Squirrels chase each other merrily around the moulding of the wall, and the ornamentation of the massive grilles is wrought

NATURE PROVIDED THE INSPIRATION FOR THE LOVELY GATE TO THE CHILDREN'S CHAPEL, WHICH BEARS THE INSCRIPTION, "SUFFER LITTLE CHILDREN TO COME UNTO ME."

in flowers and the heads and beaks of birds, with leaves to mark the intersections of the metal-work.

The carved ceiling is like a wonder book, for on each *boss,* as the key stones of a Gothic structure are called, some loved familiar tale can be re-read in symbol.

The greatness of any Gothic cathedral depends on its architectural truth. Every stone is there because it is needed, and the *bosses* are those stones that fulfil the function of support. They occur at points where there is stress on the masonry, and the custom of ornamenting them is one that has grown through the centuries.

In the richly-wrought ceiling the position of honor goes to the Cross and Crown carved on the central stone. Immortalizing the Christmas story are exquisite reproductions of the Star that shone in the heavens when the Christ Child was born, and the Wise Men's gifts of gold, frankincense and myrrh.

Two turtle doves in a cage recall the offering made by the parents of the child Jesus when He was presented to the Lord in the Temple at Jerusalem. Under Mosaic Law this ceremony is the equivalent of Christian Baptism.

Close by the doves, decorating another boss, is a lamb. "Feed my lambs" was the command that Christ left with his disciples, and he himself was the Lamb of God.

The Carpenter's Tools stand for the dignity of labor. All work is honorable, and the Jews looked upon the learning of a trade as a religious duty. An open scroll represents the Law and the Prophets, which children of the East still learn by heart at an early age.

The Bread and the Cup symbolize the Passover Supper, the passing of the Angel of the Lord over Egypt. Four of the principal objects of the church find representation in a lily, a rose, a bunch of grapes and a sheaf of wheat. These are worship, Christian teaching, Christian education, and the giving of alms. The lily is the symbol of the Resurrection—life won through faith and worship. The stiff little Gothic rose is the emblem of the Gospel, its significance being that desert places bloom in response to the Gospel message. The grapes have their place because Christ used them so often when he wanted to illustrate a point in his teaching. Grapes, he emphasized, are never found on thorns. The wheat typifies the simple gifts that find favor with God.

One of the favorite bosses is that containing the little "praying hands." Tiny and lifelike, they are not only waiting, but working hands—as ready to give as to receive.

At the four points where the fluted fan vaulting of the chapel meets the roof appear Nature's four "L" words—those keys to the Christian character—Love, Light, Law, and Life.

This gentle teaching is continued in the Reredos, or screen above the Altar. Carved from wood and richly overlaid with gold, it provides a gleaming background for the colors that adorn the various figures.

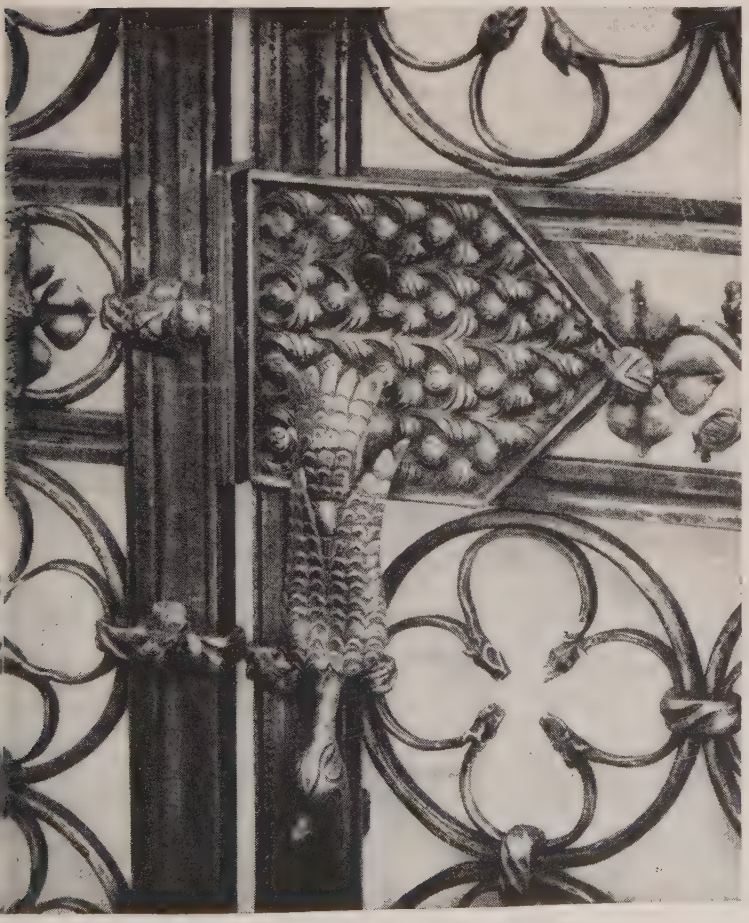
The centre space is occupied by three niches, containing figures of Christ, His Mother and the beloved disciple, John. Underneath each figure is carved a familiar Bible phrase that takes on special significance in this setting. "I am come that they might have life" is the message of the white-robed Christ. "Whatsoever He saith unto you, do it" is Mary's gentle plea for obedience, and John radiates the spirit of brotherly love.

To the North and South of these three central figures

are two canopied niches holding statues of St. Peter and St. Paul—those torch-bearers of the Faith. A panel beneath the statue of Peter shows the boy Jesus among the learned doctors, while the corresponding space below the figure of Paul shows Christ surrounded by his disciples, teaching a child at his knee. Peter's words to the children are "Grow in grace," Paul's are "Children, obey your parents."

The Altar, as is the custom, faces East and West. Beyond it, placed in a commanding position in the chapel's east wall, is a statue of Saint Michael, Prince of Guardian Angels, and especially the children's guardian angel. He is shown slaying a dragon, because it is the symbol of Evil. He is not killing for killing's sake!

The chapel's single window looks southward over the capital, which stretches far below, for Mount Saint Alban, on which Washington Cathedral stands, is four hundred feet above the city. The window ledge is low and wide, allowing little folk to curl up contentedly and look through the books and pictures that are to be found there. One of the chief uses for the chapel is that children will stay in this little church of their own, while their parents are shown over the remainder of the magnificent structure. Another is a service conducted mainly by children for children.



DETAILS OF THE GATE TO THE CHAPEL. ABOVE, BIRDS AND FLOWERS APPEAR OVER THE WELCOMING INSCRIPTION, WHILE BELOW WE SEE THE BIRD HANDLE THAT NESTLES IN THE SMALL HAND AND THE HEADS OF BIRDS IN THE GRILLES

The window, in harmonizing ruby, sapphire and topaz tones, portrays the four most famous boy characters of the Bible—Samuel, representing the Church; David the State; Timothy the saintly life, and the lad with the loaves and fishes, who has a practical significance.

David is shown in several rôles—carrying corn and loaves to his older brothers, embracing Jonathan, and playing his harp.

He is the symbol of physical courage and humble service, while Samuel, who answered the call to the Lord's service while still a child, is the embodiment of spiritual grace.

The introduction of Timothy is a tribute to the first three-generation family of Christians. Timothy's father was a believer before him, so was his grandmother Lois, who brought him up and, as is the way with grannies, adored him. She is shown here giving Timothy instruction.

Companioning these three famous boys is a lad whose name we shall never learn. Nobody thought to ask it when he offered his loaves and fishes, and it has been lost to

history. But a miracle was wrought through his service and lasting honor has been paid to him in this jewelled window.

While this chapel was completed in 1936, it was only on September 15, 1939, that it was formally dedicated. Speaking at the impressive service on this occasion the Bishop of Washington said that in this lovely chapel Washington Cathedral possesses "a glowing witness to Christ's love and understanding of children." "The spirit of childhood," he emphasized, is "a healing grace in the troubled world of today" and this chapel of theirs "attests to the great truth that the spirit of the child must come back to this distraught, disordered world before real peace may be known."

•

Where Only God Has Been

By U. C. DEIKE

Each year, before continued frost
  Establishes command,
A spirit of expectancy
  Pervades the forest land.

For seemingly the woodland folk,
  Each animal and bird,
Are moved to new activity;
  By ancient instincts stirred.

In Nature's vast and fair domain
  I sense a mystic power
That moves the seasons on their course
  From dormant root to flower.

Within those solitudes so deep
  That leaves are heard to fall,
I feel close to the Infinite,
  Which hovers round us all.

My faith expands on mountain sides
  When autumn paints the scene!
Come! Let us find a wilderness
  Where only God has been.

•

Just "Nick"

By R. G. HOTCHKISS

"NICK" lost his mother when she became caught in some barbed wire and bled to death, leaving him alone and hungry. A neighbor heard the youngster bleating and brought it to me because I have dairy cows. He was christened Nick and became a bottle baby. That was three years ago. He has never been penned and he is frequently about the place, and often brings some of his deer friends with him to the corral near the house. The dogs seem to like him and he returns the affection.

Some months ago a mountain lion turned up on the mountain some distance away and Nick appeared with forty-two other deer to enjoy the sanctuary of the corral. My eight hundred acres, on Lake Mountain, Trinity Co., California, are well placarded with signs saying "Tame deer No hunting". Since we are not on a main highway we have been troubled only once or twice by "city hunters" who are likely to shoot at anything that moves. When the hunting season starts, my wife ties bright red ribbons on Nick's horns and he seems proud of the ornament.

"PLACE OF SORROW"

The world's rarest butterfly and Matecumbe Key

By FLORENCE MOORE GRIMSHAWE

THE COMPLETE LIFE CYCLE OF RARE *PAPILIO PONCEANA*

Here we see this beautiful swallowtail, only twenty-four specimens of which are in collections, in all of its stages from egg to adult. In the inset, right of the butterfly, are eggs and minute caterpillars. A large caterpillar is on the leaves and the cocoon is seen supported at the bend of the twig

LYING like a broken necklace kicked by the toe of Florida, the peaceful, verdure-clad islands known as the Keys are strewn southward along the coast and into the Gulf of Mexico. Using them as stepping-stones, the Over Sea Highway now runs from Miami to Key West. Some ninety miles south along this route is Lower Matecumbe Key, the locality of our story.

To the student of butterflies and moths the word locality is magic. It suggests rarity because many species are confined to small regions. Such a rare butterfly is the great swallowtail, *Papilio ponceana.*

Matecumbe, in the language of the long-vanished Calloosa Indians, means "the place of sorrow." To the lepidopterist, this name for this Key, which is as rich in legend and mystery as the great fastnesses of the Everglades, may well have a special meaning—the sorrow of the extinction of a species. This Key is four miles long and about a mile wide, bordered by Florida Bay on the west and fringed with heavy, black mangrove. Parallel with this fringe is a dense tropical hardwood hammock, its foliage rising no higher than thirty feet. As the land slopes toward the east there is a mass of tangled buttonwood, and then, on the Atlantic side, a sand dune rises to some twenty feet.

It was from this dot of land that my first *Papilio ponceana* came, a trophy brought back by my husband, companion of twenty years collecting in south Florida. This was in May, 1935, and the find was actually a by-product of a trip he had made in search of arboreal snails. While scanning the branches of a stately old gumbo-limbo for one of his prized jewels, a butterfly sailed into his line of vision and floated down within reach. Having no net, he used his helmet, and a flying tackle captured the butterfly with slight damage. He bore it proudly home in his cigaret case.

We had collected extensively on Lower Matecumbe, and had never met *P. ponceana* there before. Knowing all too well the hordes of mosquitoes and the villainy of the cactus on the Key, and feeling that this specimen must have been a straggler, I was not anxious to join the next expedition. My husband, however, was not satisfied that the butterfly had come there by chance, and set off again, this time armed with net and cyanide jar. The latter was empty on his return, so I tactfully congratulated him on his catch of tree snails and said nothing of the butterfly.

He seemed downcast as he ate dinner, but when he pushed away from the table and suggested a cigaret from the box under the couch pillow, I was slightly suspicious. And when I found the box I discovered I had reason, for he had carefully tucked away three *Papilio ponceana.*

"It was about ten when I got to the island," he said, "and I kept my butterfly eye open for these fellows. I'd about given up and gone back to using both eyes for snails.

AN ADULT CATERPILLAR OF THE *PAPILIO PONCEANA*
On emergence it is black-brown, but with successive molts the white markings increase and irregularly spot the caterpillar in the striking fashion shown in the picture

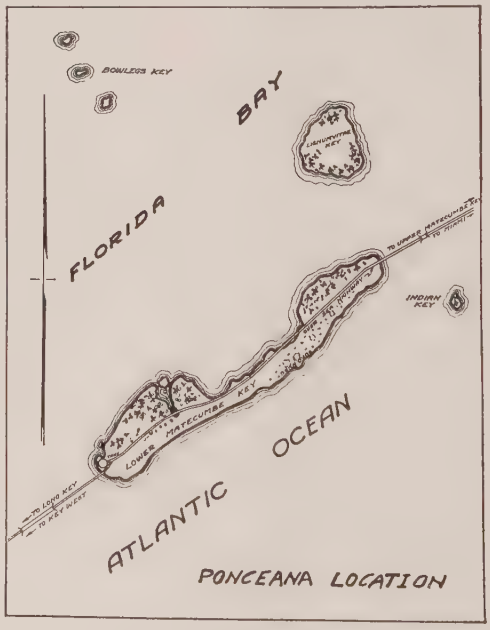
I'd worked into a dense jungle spot shaded by Jamaica dogwood and not much high foliage. There, not more than eighteen inches above the sand, hovered two individuals. It seemed as though they were seeking moisture or their host plant. It looked as if I could get both in the net, but one seemed to vanish and the net held only one. I came back to the same spot a half hour later and got the second. The third one I found nearby."

It was now plain that I must go on the next trip—heat, cactus, and insects notwithstanding. This expedition produced three more specimens, and we then had seven, five of them females. Yet we had not seen any of them taking nectar from flowers and we were in the dark as to what was the host plant.

We reviewed what was known of *Papilio ponceana.* It was first captured in May, 1898, by Dr. William Schaus in the great Brickell hammock near Miami, Florida. It was described by him in *Entomological News* in 1911. Type specimens are in the United States National Museum in Washington, and a single specimen, caught near Miami in 1924, is in the collection at Harvard. We knew it to be a valid species, and that there were only three specimens in existence in collections until we added our seven. Today, I believe, there are only about twenty-four. But there was much no one knew, and we were determined to find the answers if possible.

It was still night when we left Miami, to greet the dawn en route. And it was a dawn of such beauty as to augur well for a day dedicated to seeking out the secret of a rare and lovely butterfly. I had seen dawns over the Appalachians and the Gulf of Mexico, over the Atlantic and the prairies, but this *was* a dawn. Through the bold crags of cloud mountains great jets of brilliant sun rays shot out like the ribs of a fan. They painted the clouds in shades of orange, pink, purple, silver, red and gold. Between us and the horizon stood orange groves against a background of Australian pines. Mockingbirds sang and cardinals called their tribute to a new day. The night's rain gave an emerald lushness to the grass.

Silently recording this scene on the sketchbook of memory, we sped on beside murky canals dredged through the massive mangroves. On to Key Largo, the largest of the Florida Keys, and the pristine splendor of virgin hammock land. Large land crabs scuttled across the road as we drove. With whirr of wings, white-crowned pigeons, once almost extinct on the Keys, wheeled over the hammock, seeking berried trees and shrubs.



LOWER MATECUMBE KEY
One of the Florida Keys that are dotted southward toward Key West

In the thick hammocky growth were wild tamarinds—and then, as the flora changed, no more wild tamarinds. In a salty pool the noses and eyes of two baby crocodiles were visible. Across Upper Matecumbe Key to Lower Matecumbe, and the home of *Papilio ponceana* was reached.

Mosquitoes were there in a generous number to meet us, also a flight of large dragon flies appeared, to dive-bomb upon the fiery-billed pests. Loaded with knapsacks, nets, and canteens, we left the rugged shore and the glimmering silver waters of Florida Bay to make our way to the gay, palm-fringed beach of the Atlantic Ocean. In the cool, balmy air was a mixture of fragrance from tropical flowers and the salt breeze from the sea. Our winding

trail led through beds of the dreaded spiny cactus and over the jagged coral rock. But we pushed on to be "on location" before the first flight of our treasure trove; across a low, boggy area, under and over the matted buttonwood to the sand dunes—the haunts of *Papilio ponceana.*

Nets were unfolded; the cyanide jars and boxes conveniently arranged. As the morning passed, the clouds, as though realizing the importance of the occasion, gradually dispersed. We made our way into every nook and corner of the hammock. By two o'clock in the afternoon we were forced to retreat to the open shore line before a terrific attack of bloodthirsty mosquitoes. Thus far we had had no glimpse of our butterfly.

An hour later, refreshed by the trade winds, we resumed the hunt along the sand dune farther to the south. As we approached an open place in the hammock a female *P. ponceana* slowly descended to within a few feet of where I stood. She hovered over a branch of the torchwood, *Amyris elemifera.* My impulse to net the specimen was restrained with effort, and I was rewarded when, in full view, an egg was deposited. Satisfied that the host plant was found, we captured the specimen and a search in the near vicinity disclosed that the eggs were always deposited singly on the top of the tender leaves of torchwood. In rapid succession three other females were taken within a radius of fifty feet. Gathering a supply of the food plant we turned our course toward the highway and home. One question was answered.

THE BUTTERFLY HAS JUST EMERGED

The wings are black-brown with yellow markings. Underneath there is a broad band of rich dark maroon. On the hind wings are a series of metallic lunules

The eggs of *Papilio ponceana* are smooth and almost round, a pale greenish-cream color. The story from there on was followed closely as we watched the life process of the species on the branches and leaves we had carried home. The period required for the emergence of the caterpillars averaged eighty-four hours under a temperature of approximately 87 degrees. For example, eggs deposited in the afternoon of June 9, 1935, emerged on the morning of June 13.

When the caterpillars emerge they are black-brown, except for the thirteenth segment, which is white. Also, a minute faint light speck is visible on each side of the seventh ring. This grows more distinct daily, becoming a clear, round, white spot at the first molt.

The first molt takes place upon the fourth or fifth day. Immediately after the molting the larva as a rule eats its cast-off skin, and adorns itself with a white hood.

With the second molt blue or metallic dots appear, with the early blackish-brown color transforming into a lighter shade. The white on the anal extremity extends forward into the twelfth segment.

The third molt brings other white markings of irregular shape along each side of the body, while the white spot on the seventh ring increases in size and projects back into the eighth ring. This development is fascinating to watch.

At the age of twenty days the caterpillars go into their fourth and last molt, having gone through molts at intervals of approximately five-day periods. At this mature stage the white markings have changed to a creamish-yellow, except those on the anal segments, the hood, and the markings on the third ring. However, the band or hood of the second segment is capped with the creamish-yellow.

Spots of robin-egg blue appear like jewels upon a soft maroon background. The true legs are blackish-brown; the prolegs are shaded white; the anal prolegs are a uniform white. Teasing the caterpillar brings a white, bifurcated or pronged organ out of his nape-ring. This exudes a strong odor.

The mature larvae, at normal rest, measure fifty-six millimeters. These caterpillars are solitary and enjoy no community life as do the larvae of the *P. polydamus.* Throughout all stages of their development they require a large quantity of water. After sprinkling the host plant with water, I have seen a larva drinking several large drops before satisfying its thirst.

During the time of rearing the caterpillars I did not know of a nearer food supply, so was obliged to make the trip to Lower Matecumbe Key two or three times a week, a round trip of a hundred and eighty-eight miles.

When ready to transform, the larva seeks a place of seclusion, each for itself, and fastens its anal extremity with a button of silk, and throws a heavy girdle around the thorax, supporting the body in an upright, or vertical, position for the long sleep.

The encased segments of the body of some of the chrysalides are rusty-brown color; others are gray, etched with moss-green and conforming (Continued on page 611)

A LARGE CAROB TREE ESTIMATED TO BE AT LEAST 35 YEARS OLD

This is one of several thousand trees in Santa Barbara County in California in a grove believed to be the oldest and the largest in the United States. For lack of early trimming, the trees have taken irregular forms. Nevertheless, they are now producing some three thousand pounds of sugary pods a year. These are being used to manufacture livestock foods. The dark patches among the leaves are the clusters of large, nutritious pods

Saint John's Breadfruit

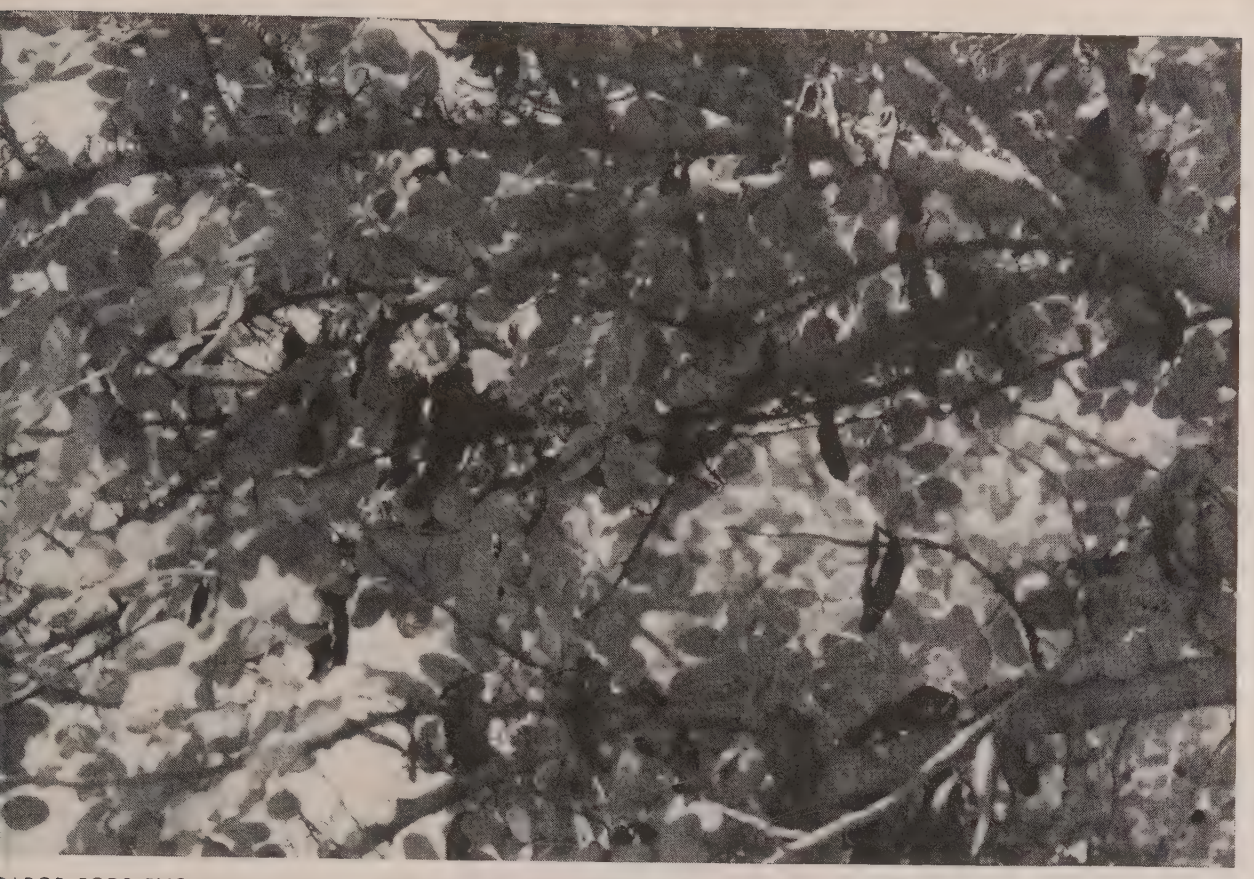
A tree that merits addition to our arboreal wealth

By JOHN EDWIN HOGG

FROM a time antedating recorded history, the carob tree, *Ceratonia siliqua,* known also as honey locust, algaroba, Saint John's breadfruit, and by various other names, has thrived, beloved by all mankind, in the semi-arid lands bordering upon the Mediterranean Sea. Its fruit is, presumably, the locust part of "locusts and wild honey", mentioned in The Bible as the food upon which John The Baptist subsisted during his sojourn in the wilderness.

This tree evidently originated in Palestine, to be spread by the hand of man into all the Mediterranean countries —and much more recently into southern Asia, many parts of Africa, the United States, Mexico, South America, Hawaii, Australia and New Zealand. As a relatively new and potential source of American arboreal wealth now being added to our national economy, the carob becomes a subject of interest because of what it promises to do for us. Experiments toward the utilization of this valuable tree have been under way in at least nine states for the past three-quarters of a century. Now thousands of fully-matured trees, thriving and bearing fruit from southern Florida into northern California, are ample evidence that we have tens of millions of little-used acres climatically-suited to carobs.

The first carobs the writer ever saw were in Palestine late in the summer of 1912. The summer climate of the Holy Land is hotter than the proverbial hinges of Hades, and it was on a red-hot day that I set out with



CAROB PODS PHOTOGRAPHED IN FEBRUARY. IN SEPTEMBER THERE ARE AS MANY PODS AS LEAVES

Dried and put in burlap sacks, the pods may be stored without deterioration. Below is Dr. George S. Oliver with a sack of pods that he will feed to his terrestrial livestock on his earthworm farm. Earthworms need sugar

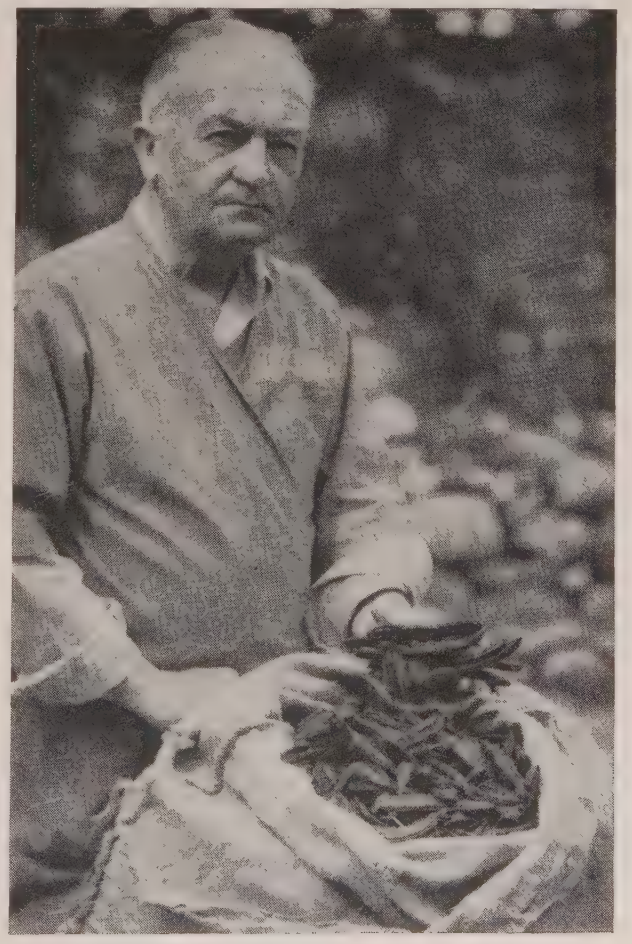
German-Jewish guide for a trip from Jerusalem into he Valley of the River Jordan. We made this trip in n automobile, or such it was called, for it had been uilt in the United States several years earlier. More- ver, the roads in Palestine then were indescribably rrible!

Returning to Jerusalem, a few miles out of Jericho, he old car blew a tire. Epstein, the guide and chauffeur, mediately set up a big umbrella and went to work to ake repairs. Meanwhile, I beat a retreat from the wither- g sun into the welcome shade of a nearby grove of ees.

There were, perhaps, fifty trees in the group. Each as about sixty feet high, and the branches would easily ave overlapped a fifty-foot lot. Their smooth bark was milar to that of the American hard maple. The leaves esembled those of the New England white birch. Equally range to me were the great clusters of bean-like pods, foot or more in length, with which all the trees were estooned.

An Arab sheep herder was under the trees with his ock of some fifty sheep and was busy with a long pole nocking the pods off the trees. The sheep were devour- ng these as fast as they fell. I noted, too, that the Arab as eating them.

I tried to talk with the herder, but we had no language n common. I reasoned, however, that if the man and his heep could eat the pods, I was perfectly safe in trying hem, and grabbed one from under the nose of a sheep.



Sniffing it, I got a whiff of pleasing fragrance like nothing I'd ever smelled before. I took a bite and my teeth cut through it as if I had bitten into a perfumed, rubbery gum-drop. It required considerable chewing, but I found the fruit palatable. It was like old candied citron flavored with brown sugar, raisins and honey.

Some minutes later, Epstein, having finished his work with the tire and sweating like an ice-pitcher, joined me and the Arab sheep herder for a brief rest in the shade.

"Saint Johan's Brotfrucht!" he exclaimed as he saw me nibbling a half-eaten pod. "How do you like it?"

"It tastes like cheap candy to me", I replied, "but there must be great food value to anything that contains as much sugar as this fruit does." In Epstein's faultless German, I then heard the detailed story explaining the great esteem of the Arabs for the carob tree. In brief, the story is that it is the predominant tree of countless Arabic landscapes. The fruit is the staple food of millions of Arabs, and, without it, Arabic domestic animal husbandry would come to an end. Carob pods are the chief food—often the only food available—for cattle, horses, asses, sheep, goats and swine!

THE AUTHOR INSPECTS TREES IN A NURSERY FOR CAROBS

This picture shows a new type of container for cultivating the trees. It is a tub that is put in the ground with the tree and then is broken apart by cutting two wire hoops. The pieces of tub are removed and the root system of the carob is undisturbed, aiding rapid establishment

Years later I returned to the Mediterranean countries to discover that what I had learned about carobs in 1912 was little more than a prelude to the economic importance of the tree in 1939. In Syria, Egypt, Arabia, Greece, Italy, France, Spain, Portugal and the Barbary States there are now forests of carobs upon lands that were bald hills and treeless plains not so many years ago. Carobs are now being extensively used for the control of soil erosion, and by such plantings a whole new field of economic wealth has been created.

Carob wood is an excellent firewood, but it is little used for fuel because of its greater value for other purposes. The wood is hard and close-grained. Yet it is easily worked, takes a high polish and is practically free from any tendency to warp and split. It has become one of the most-prized of European commercial woods for furniture, interior finishing, tool handles, stocks and forends for firearms, and serves numerous other purposes.

Since the carob pods are forty to fifty-five per cent sugar, sugar is now manufactured from them, and it is a grade of sugar especially in demand by the confection and baking trades. Honey-like carob syrup appears on millions of European tables. It is the most delicious of inexpensive syrups. Carob meal of high nutritive value is cooked into a wide variety of bread and cakes, becoming at once food, sweetening and flavoring. The chopped-up fruit is used as we use nuts and raisins. Sweet, pickled Saint John's breadfruit is found all around the Mediterranean, while the same fruit candied in its own delicious sugar is everywhere a popular confection.

Carob fruit by the tens of thousands of tons now goes into the manufacture of industrial alcohol. Carob wine, with low alcoholic content, has become increasingly popular in all these countries where water subjects the drinker to numerous health menaces. Distilled, the wine becomes brandy.

The demand for stock food, however, is still the major market for carob pods produced by the Mediterranean countries. In years of normal rainfall, when grass crops are abundant, there is always a profitable peacetime market for a great surplus of carobs, in England, Holland, Denmark and other European countries with a large domestic animal population and a chronic shortage of highly-nutritive stock food. Carob trees will stand three or even four consecutive years of serious drought with little reduction of the fruit crop. Thus the Mediterranean countries have strengthened their economies by exporting tens of thousands of tons of carob pods during every recent year of normal rainfall. In years of drought, when their own grass crops are scanty, they curtail the carob exports, and have the abundance of high-grade food they need for their own domestic stock.

When we observe the enormous economic value of the carob to all the Mediterranean countries we may logically ask: Why have Americans been so slow in discovering this valuable tree and introducing it into all the tens of millions of now little-used, semi-arid lands where we have the climate and soil to grow veritable forests of them? The answer is, we have not overlooked it. We began experimenting with it as long ago as 1854, and the development thus far merely parallels much of our agricultural history. If the progress seems slow, many similar instances of foreign plant introduction have been infinitely slower. There are always many factors involved.

The Spaniards were in California for nearly 300 years without discovering a climate and soil suitable for the cultivation of citrus fruits, which are now a $150,000,000-a-year item of California agriculture. And California was under the American flag for several decades before the first Brazilian orange matured on a tree near Riverside. Even then, it was a lot of enterprising real estate men who really "sold" oranges to California. They adopted it as an accessory to the sale of land, backed it with ballyhoo, and smashed all previous records for speeding an agricultural development with a crop not native to America!

As long ago as 1687 the Spaniards planted fig trees in California. The trees thrived but refused to bear fruit. Then, after 150 years, biological science caught up with the fig trees in California, found the wasp necessary for pollenization, and brought the trees into bearing. California produced 40,000 tons of figs in 1939.

Cotton from Egypt and India was introduced into Virginia in 1650. But it was not until 1786 that the cotton experiment became sufficiently encouraging to induce James Madison to assert: "There is no reason to doubt that the United States will one day become a great cotton-producing country." Madison was severely criticized for this outburst of "unbridled enthusiasm", as certain conservatives called it. Of course, he was right, but it took a long time to prove it. His prediction came true only after Eli Whitney perfected his cotton gin in 1793. Thus there was a lapse of 136 years between the introduction of cotton into the United States and the real beginning of cotton as a major factor in American agricultural and industrial economy.

THE FOLIAGE OF THE CAROB IS OF NOTABLE CHARACTER

Few trees are more beautiful in their leaves, which in the carob are dense green and grow so thickly that the tree produces heavy shade. For this reason they have definite value for ornamental planting. Proper trimming will give them form like the tree seen pictured on the next page

Tung oil was known and used by the Chinese for many centuries before Americans began buying it from them in shipload lots. And we imported it for at least 100 years before some "unbridled enthusiast" tried growing tung trees in the Gulf Coast States. We are growing a lot of tung trees now and we are going to grow millions more of them—to the untold advantage of both agriculture and industry.

Eucalyptus trees were known in Australia for 75 years before anybody ever saw one in California. Today, what would California do without them? It also took our same, usually fore-sighted Californians half a century to start some experiments with the growing of dates—and then another three decades before the date experiment came through with enough success to start a really important addition to American agriculture. If space permitted, similar examples of the slowness of foreign plant acclimatization might be cited almost without end. There is at least no shortage of evidence that such accomplishments are usually one of the slowest forms of human progress.

The first American interest in carobs began in 1851 when an American consular officer in Spain wrote the U. S. Patent Office urging introduction of the tree into our southern and southwestern states. The Patent Office was open-minded toward the suggestion and in 1854 obtained a small shipment of seeds and saplings from Spain.

The Patent Office, in addition to undertaking hot-house experiments in Washington, D. C., also distributed some of the seeds into the southern states. We now have records of some 8000 carob trees in Florida, Texas and California from the plantings of 1860. This seems to check with the now-known fact that carobs grown from seeds become fairly good-sized trees and begin to bear fruit in five years. Some very old and enormously large carob trees were recently inspected by the writer in Florida, Texas and California. These trees are undoubtedly some of the earliest of American plantings. The fact that they are still thriving and bearing heavy crops of fruit each year is visual evidence of their adaptability in vast, little-utilized areas of our southern and southwestern states.

One of the largest of these old carob groves is in Santa Barbara County, California, where, last year, 600,000 pounds of pods were harvested and sold at the reported price of seven cents per pound to a single manufacturer of a trade-name stock food. Meanwhile, Lawrence Holmes, of Riverside, California, won a judgment of $450,000, when his 1100 acres of eighteen-year-old carob trees became the site of the Cajalco Reservoir, part of the southern California aqueduct tapping the waters of the Colorado River.

The most recent large importation of carob trees came from Spain in 1911, and was received by the Depart-

ment of Agriculture's Foreign Plant Introduction Field Station at Chico, California. Thus the vast bulk of recent American knowledge concerning the possibilities of this tree is based largely upon the ultra-modern Chico observations and the work of a few private horticulturalists, whose experience for the most part dates back less than twenty years. All this is a very short time in terms of exotic plant acclimatization.

Meanwhile, it is doubtful if any more promising foreign plant has ever so completely escaped the attention of American writers, editors and publishers. Search the libraries, as the writer has done, seeking information on carobs, and discover how very little has ever been published in English. Numerous authoritative articles have appeared in European publications, but, untranslated, they are useless to Americans who cannot do their reading in French, German, Italian, Spanish and Yiddish. Thus, publicity has not helped use.

AN ORNAMENTAL CAROB IN CALIFORNIA

Growing in Alhambra, the tree is between 35 and 40 years old, almost spans a fifty-foot lot, and shades a five-room house. It yields some 3000 pounds of pods every year

Carob literature received by the writer, in response to a request to the U. S. Department of Agriculture, consists of a four-page leaflet containing an outline of the economic importance of the tree to the Mediterranean countries. It assures us that the tree will thrive and bear fruit in all parts of the United States where rainfall is six inches or more each year, and where winter temperatures do not ordinarily go below fifteen degrees (F.). It gives an analysis of the nutritive value of the carob pod as food for livestock to make any stockman's eyes bulge—and then, with amazing imagination, tells us that the carob makes an ideal shade tree and is useful for the beautification of highways in those parts of the country where the climate is suitable for its growth.

Nevertheless, the future of the carob as an American contributor to the national economic welfare now seems to be assured. In southern California, the world's greatest proving grounds for trying out any promising idea, a few private entrepreneurs have discovered the carob tree. Realizing the incalculable value of the tree, they have gone into the nursery business, and they're doing a bang-up job of advertising and sales promotion. An abundance of year-old carob saplings is now available for transplanting. Such young trees retail at $1.50 each, and they are being bought up and transplanted out by livestock breeders in various parts of the Southwest.

Because of the enormous taproot that makes the carob a drought-resisting tree, the nursery stock is cultivated in tin pipes five inches in diameter and five feet long. Young trees, pipes and all, are then transplanted into holes dug with a post auger. By the time the pipe disintegrates the trees are firmly established.

The young trees require some minor care and watering for the first three years. But after the third year they will shift for themselves and need no human assistance whatever. A five-year-old tree will produce from 300 to 500 pounds of fruit, and this yield will steadily increase from year to year. By the sixteenth year, the usual yield will be around 3000 pounds.

According to Dr. A. Aaronson, head of the Jewish Agricultural Experimental Farm, at Televive, Palestine, the stock food value of carob pods is two and one half times that of barley. Tell this to the American stock farmer, who faces financial ruin with the very prospect of drought—and he is all ears and interest. If he lives where the climate is right, he may soon be planting carobs!

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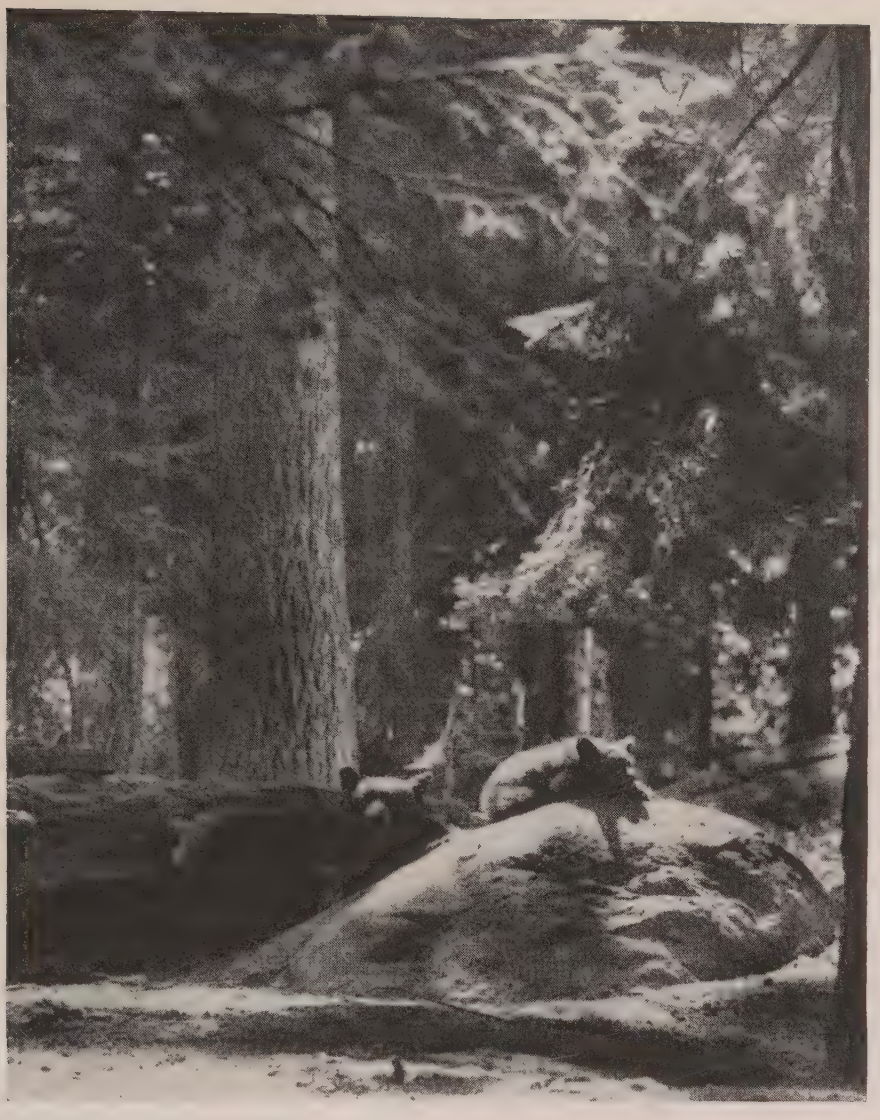
Eternal Rhythms

By MAUD LUDINGTON CAIN

God is a poet—else he would not make
A brook that sings and dances in the sun;
A forest where the woodland echoes wake;
A wheat field where the rippling-gold waves run;
A bluebird lilting from a willow bough;
A crocus springing from the dark, moist sod;
A seed that waits the hand upon a plow;
The need for prayer—a turning back to God.



REST HOUR IN THE FOREST

Mother resented the intrusion of the photographer, and had she been alone would probably have lumbered off, grumbling to herself. With her cubs to protect, she chopped her jaws and snorted, sending the cubs scampering while she walked threateningly toward the invader

The Ways of a Bear

By PAUL B. KINNEY

Photographs by the Author

FOLK-LORE and imaginative fiction have so distorted our conception of the bear that the real animal is hardly recognizable when met and observed in the forest. Equipped by Nature with a huge body, powerful muscles, large claw-studded paws, and long glistening teeth, the American black bear might be expected to be a predator, a carnivorous mammal, horrible to behold, a menace to all life, an animal from whom even man should flee in terror.

In reality, he is neither vicious nor pugnacious. He is omnivorous and will eat anything, although he shows a predilection for vegetable matter. Not alone in his food, but in his behavior, also, the black bear is a paradox. He is both the most interesting and the most baffling of wild animals.

Highly intelligent, inconsistent and often impulsive, he is wholly unpredictable in his actions. He is the clown of the forest. He will climb a tree simply to slide down a branch like a boy sliding down the banister. He will fight a ferocious battle with a small bush and then strut off as if he had conquered the world. He has a world of self respect and dignity in the presence of others, yet alone he becomes a rollicking, hilarious prankster with a sense of humor and imagination that is decidedly mischievous.

Born during hibernation, in late January or early February, the black bear weighs then about half a pound. Ten

ABOUT TWO WEEKS OUT OF HIBERNATION

This photograph was taken on May 14, with the snow still heavy except in exposed spots. This bear was nine years old when the picture was taken, and the author had known him since cubhood

years later, when he reaches his prime, he may weigh four hundred pounds, or more. Except for the marsupials, the bear at birth is the smallest of mammals in proportion to the adult size, yet he becomes the largest of our fur-bearing animals.

During his first year, a bear cub's life is idyllic. Fed and protected by an adoring, self-forgetful mother, the cub eats, sleeps, and grows fat. Of cares, he has none.

Contrary to popular conception, a mother bear does not abuse her cub. She is a strict disciplinarian and does not hesitate to punish disobedience. Experience has taught her that a headstrong cub soon comes to grief if its enthusiasm is not curbed. But she is neither cruel nor vicious with her chastisements. I have seen an adventuresome and disobedient cub knocked down by a large male, and have seen the mother, with utter disregard for herself, dash to the protection of her offspring only to be in turn mauled by the male bear. Then, when her mission had been accomplished and the cub saved, I have seen her kiss him and search tenderly for injuries before ever attending to her own stinging wounds.

However, mother love—intense, self-sacrificial, tender almost to a fault—is short lived. By the second spring it burns itself out and grows cold. Mating season in California is June. Before that time arrives, mother bear, her instincts having turned to the coming generation, drives her cubs into the forest, and from that day will never again recognize them as her own flesh and blood.

As a yearling, the black bear begins his solitary life in the forest. The whole forest is now his home. He does not have a den to which he returns periodically to sleep. He sleeps where and when he feels sleepy, usually during the heat of the day, often upon some high boulder, a fallen log, or among the branches of a tree. He eats what he finds, where he finds it. Regardless of whether he is the only bear on his particular range, or whether he chooses to live in a thickly populated area, as in one of our National Parks, the black bear is an individualist and remains such throughout his life.

KEEN EYES OR SENSITIVE NOSE?

This bear remained in the position shown while the author advanced a good one hundred yards. He seemed to smell but not see the invader. When he finally left, the object of his attention proved to be a single train of small red ants

While the behavior of individuals may differ slightly, and the habits vary with the region, general traits of the black bear are similar wherever found. When necessity demands, a bear, with rare exceptions, proves himself courageous. He is a bluffer without equal; an artist who will go to no end of trouble to accomplish a successful bluff. Of course, a bluff that leads to a battle is not a success.

It is a great privilege to watch two accom-

THE CUBS STAY CLOSE TO MOTHER ON THE GROUND

When following the bear trails the cubs follow in single file, often breaking formation when crossing a clearing. When these two reached the trees mother commanded them into their proper place

plished bluffers meet on a bear trail in the forest. With a hundred yards separating them, the first bear will sit down and stare off through the trees. The other, not to be outdone, suddenly finds an unusually interesting patch of sunlight that he proceeds to investigate.

Five minutes pass. The first bear heaves a big sigh, rises slowly and with a great show of indifference, moves off the trail, examines a stump and returns aimlessly to the trail again. By this time the other has decided the sun patch cannot be eaten, and he too returns to the trail.

Neither has yet given the slightest indication, by act or expression, that he is aware of the other's presence. Each, however, is secretly watching the other's movements, and the hundred yards that separated them has dwindled to fifty. This strange pantomime of pretended unawareness is repeated, and possibly half an hour after they first sighted each other, twenty yards still separates the two.

Suddenly, unable to stand the suspense longer, one breaks the silence of the forest with a loud snort. The other, pretending great surprise, stops dead in the trail. He may chop his jaws in an ominous manner, or may simply sit down, apparently thinking over the situation.

Another five minutes pass with no offensive gestures other than the hollow clicking of teeth as each bear wags his head and chops his jaws. Both appear bored to death, yet each enjoys the game hugely.

Presently, the suspense becomes too great for one, and he waddles stiff-legged toward his opponent. This is the first sign of weakening. Fear plays no part, for both are courageous, but suspense often breaks nerves that would remain calm in actual combat. Before he has lessened the distance by half, the bear veers off the trail and slaps viciously at a bush. The other may sit or stand quietly, pretending to watch a deer in the meadow.

Suddenly, the first bear makes a lunge, his paws making a mighty thud as he slaps the ground and stops short of his opponent. Then, with mouths agape, heads held low and turned slightly, both bears bellow like cows. The forest resounds to their roars, and one expects a titanic battle to ensue.

Presently, the less proficient bluffer steps cautiously aside, and continuing his threatening jaw chopping, makes off, his dignity preserved and his hide intact. The other, shaking his head, sad that the game is over, waddles aimlessly along the trail he was following when interrupted.

The American black bear is not so industrious as his cousin, the grizzly bear, but although he appears to be an idler, he is not. His senses of smell and hearing are un-

PITY THE POOR MOTHER BEAR

The cubs are always hungry and persistent in their demands for food. Although she sat on a log to rest, the youngsters decided that it should be meal time and that, anyway, there is no time like the present to eat

usually keen. Far from being the dumb brute that many suppose, he is a resourceful thinker. He is anxious to learn, and he immediately investigates in a thorough and intelligent manner each unusual situation that arouses his curiosity.

When the bear eats, the bars are down, and woe to the unwary camper who leaves food unguarded. He has catholic tastes, a magnificent appetite, an enormous capacity, and a digestive tract that must be leather-lined. He eats anything he can get and all he can get of it. Bruin has few inhibitions where food is concerned. It may be bitter, sweet or tart; green or ripe; dry or juicy. He asks only that it be edible—not digestible, simply edible. Skunk cabbage, the juice of which might just as well be sulphuric acid; bitter cherries, that taste like a mixture of alum and quinine—these he will eat with gusto, smack his lips and look for more.

All in all, the life habits of the American black bear constitute one of the most interesting, amusing, and, at times, baffling studies of wild life. But it is such things that add zest, and flavor pleasantly the study of Nature. In the process of taking one wild life photograph, a person learns far more about the animal than if he had collected a dozen specimens with a gun.

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Motor Power

By ROSALIE EDGE

Steel-winged, the humming fan makes slumberous sound
Within my chamber slatted from the sun;
Aeolus' captive, its tempered breezes spun
From vanished forests prisoned underground,
From long-dead trees and ferns through ages bound
In seams of rock. Such victories man has won.
But, tyrant of the skies, what has he done
To chain the might of living flowers, what found
To rival humming wings of Ruby-throat
Whose motor, smaller than a drop of rain,
Has power beyond what any man can reckon?
Green spark of sun-fed fire, dancing mote
That drinks the garden's bloom, and counts it gain
To fly three thousand miles when tropics beckon.

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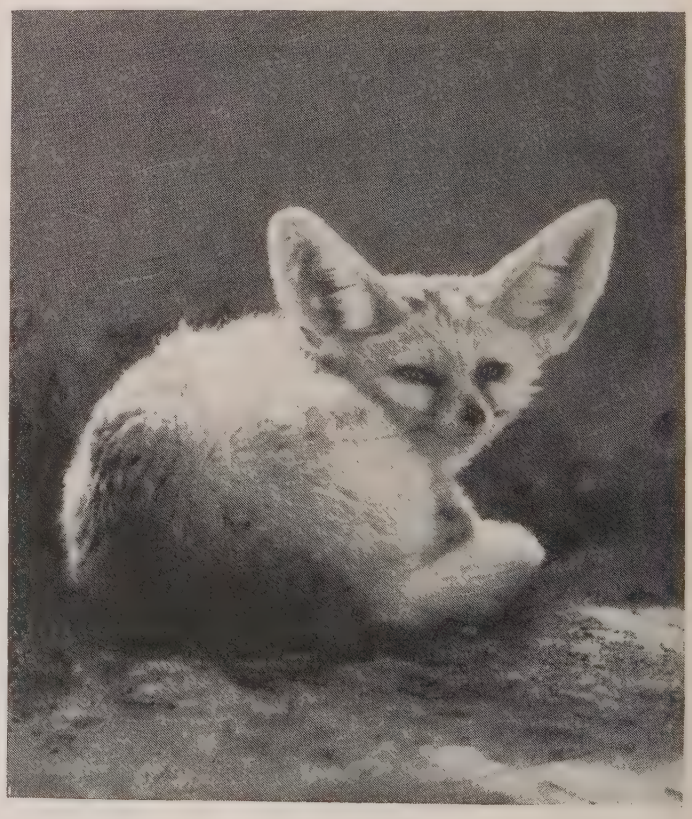
The Fennec

By ARTHUR H. FISHER



THE smallest of all the extensive canine tribe is the fennec fox, *Canis zerba*. It is found near the oases of the Sahara Desert in Northern Africa. An adult specimen measures only fifteen inches from the tip of the nose to the end of its black-tipped tail, and since the tail measures seven inches, only eight are left for the length of body—truly a tiny fox. However, what the fennec lacks in size of body is certainly made up in the remarkable dimensions of its ears, which greatly exceed, in proportion to face, those of any other species of wolf, fox or dog, even our own little desert variety, the kit fox, which is also well equipped with receiving sets.

The fennec is a nocturnal creature, feeding on mice, small birds, lizards and insects, and no doubt this highly evolved hearing equipment is used to locate food in the stillness of a desert night. It is also interesting to note the way the ears are baffled by long hairs, perhaps Nature's provision to protect the delicate mechanism against the desert sand.

Its color is a pale rufous cream, harmonizing with the color of the desert, and when alarmed the animal can "dig in" with incredible speed. It lives in burrows along the fringes of the oases, and varies its diet with dates, of which the fennec is said to be fond. On the authority of reliable observers, it is able to climb the tall date palms to secure the fruit.

This little fox is rare, and seldom seen in zoological collections. This specimen was photographed by the author in the Philadelphia Zoo.

This little desert fox was photographed as he seized the bait that set off the flashlight to take his own picture. Although temporarily blinded, and terribly frightened by the explosion, he would repeatedly come back in a few minutes to recover the bait. His gait, noiseless and almost effortless, amazed and delighted the photographer, who was Laurence M. Huey.

SOME INTERESTING FUR ANIMALS

By EDWARD A. PREBLE

In addition to the American fur animals described by Dr. E. Laurence Palmer in his educational insert, several others merit brief treatment. Those here discussed practically complete the list of our American species, excepting the badger and the sea otter.

One of the most interesting is the Arctic fox, usually referred to as the white fox. Although it has been used in the fur trade ever since it was discovered, until recently it has found small favor as fur. Thanks to this the animal long remained common in its remote breeding places.

This fox is migratory, and most of them were taken near the fur posts reached by them in their southward wandering. As few migrants ever returned to the north, those harvested were mainly surplus stock. Because of the reduced supply and the delicacy of the white fluffy fur, the price of fox skins increased. This led to trading posts in the Eskimo country, which now threaten the continued existence of the species.

There are two color-phases in this animal, the normal tawny one, which is replaced in winter by pure white, and the blue phase, which is dusky in summer and bluish in winter. The latter usually bring the higher prices.

On St. George Island of the Pribilof group in Bering Sea, a judicious system of live trapping, and the elimination of the normal phase, has resulted in a herd that now consists almost entirely of the valuable dark phase.

The little kit, swift, or desert fox, *Vulpes velox*, has never been popular as fur, which has permitted its survival. Its gentle, trusting nature has led to its scarcity over much of its range. In the

This photograph of the so-called ring-tailed cat, *Bassariscus astutus nevadensis*, was taken in Yosemite National Park, California, by J. B. Herscher. It shows well this interesting inhabitant of our Southwest, a relative of the raccoon, but generally classed in a separate family.

The Arctic fox, *Vulpes lagopus*, which occurs with little variation throughout the circumpolar Arctic zone, is one of the few creatures that change to pure white in winter. This fatal beauty has been its undoing. Photograph from the National Zoological Park.

early days of the Hudson's Bay Company, the skins brought only a shilling or so each. Nowadays it scarcely figures in the fur returns, which is just as well.

The so-called ring-tailed cat of Mexico and our Southwest is much too interesting and beautiful, and too good a mouser, to be taken for its fur. Although almost strictly nocturnal, by judicious treatment it may be watched in its nightly actions, even under the glare of an automoblie headlight.

Although formerly not considered as fur, in a commercial sense, the beautifully-spotted coats of the ocelot and related felines have proved fatal gifts. Thus, also, the jaguar of Central and South America, the leopards of Asia, and other cats, have been killed in order that their skins may adorn milady.

The Canada lynx, *Lynx canadensis*, is the American representative of the boreal lynx of Eurasia. It occupies the wooded parts of Alaska and Canada, and also our northern states and high mountains. The numbers of this species, as with many others, rises and falls periodically, and supposedly follows the trend in the varying hare, its staple winter food. In summer various small mammals, principally rodents, and some birds, are added to its fare.

The spotted skunks, *Spilogale*, almost weasel-like in form and agility, occupy the southern half of the United States at low altitudes. There are a number of species, and these vary in size, and in the relative proportion of black and white. Farther south, in Central America, there are some species of pygmy size. The superior agility of these little skunks enables them to climb trees and to explore the recesses of cabins. Their food includes small rodents, and insects and other arthropods in great variety.

Probably less is known about the home life and habits of the wolverene than of any other American mammal of its size. It is a weasel, but a weasel of such strength, and one so abnormally tenacious of purpose, that one may easily give it credit for exploits that border on the marvelous. It is almost impossible so

The ocelot, *Felis pardalis*, is one of several wild cats whose beautifully spotted and marbled coats have caused a price to be put on their heads. The skins are sometimes imitated by dyeing the fur of rabbits so as to obtain a result that gives whatever satisfaction comes to those able to wear what they suppose is the skin of a rare exotic. Photographed in captivity by Arthur H. Fisher.

to conceal or guard a supply of food that a wolverene family will not discover and spirit it away, and, in doing so, disguise its multiple trails and baffle all efforts toward discovery.

The skin of this animal rarely reaches the ordinary fur market, since it is held in such esteem by the Eskimo that they buy up most of the skins. It is used to border the hood of the winter coat, or parka, where its edge comes in contact with the wearer's face, for the breath never congeals on this fur as it does on all others. In the absence of wolverene fur, the Arctic worker must turn to the fur of the wolf, its best substitute.

The Alaskan fur seal, *Callorhinus alascanus*, breeds only on a small group of islands in Bering Sea, the Pribilofs. The breeding males are called bulls; the females are cows;

With the decline of our more valuable species, the fur of the little spotted skunk has come to be fashionable. To the naturalist, the spectacle of a long coat made of several dozen of these rock pussies is both sad and amusing. To the skunk tribe this adornment has even less appeal. Photograph by H. H. Sheldon.

This Canada lynx must make his breakfast from a potential roast, instead of a varying hare, which would be his usual fare in the wild. The picture shows well the huge paws that act as snow-shoes on the light snow. Photograph by Arthur H. Fisher.

These mother seals and their pups on the Pribilof Islands are having a happy family gathering. The small number of pups shows that the picture was taken in early summer before the majority of females had given birth.

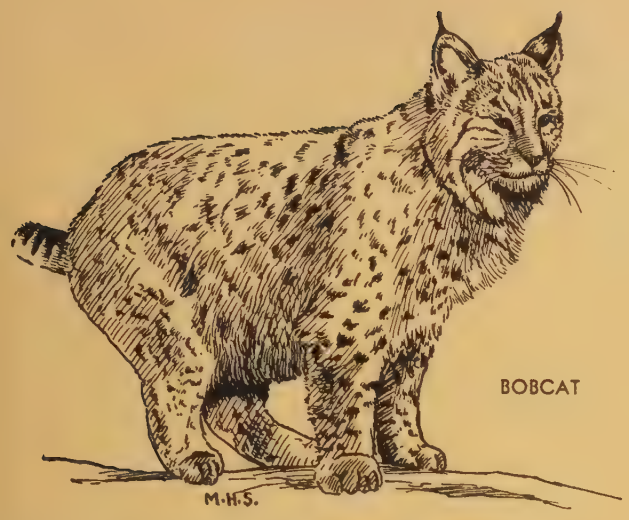
the young are pups. The immature males are half-bulls; the younger males bachelors. The nursery is a rookery, and the place where the bachelors resort is a hauling ground.

The breeding islands are practically deserted in winter, when the entire herd is at sea to the southward. The males come back first, some in early May, and pick a place on the ice-covered shore. There they remain, without food, until August. When the cows arrive, heavy with young, each picks her place. Some of the harems may number a hundred; some only a few. The gestation period is one year. Soon, usually only a few days after her arrival, the pup is born, and then the mother is allowed to go to sea for food. At intervals she returns to nurse her pup. She will nurse no other.

The majority of the young are born between June 20 and July 20; learn to swim when a month or six weeks old; continue to nurse until they leave the islands. At sea they learn to fish.

The harems break up in August, the bulls going to sea to rest and put on flesh. Some of the seals go in winter as far south as the latitude of southern California, keeping well out at sea. With very rare exceptions, no seals come ashore from the time they leave the Pribilofs in early fall until they return the next spring.

This wolverene, wild freebooter of the great North, is here reduced to eat what the keeper gives him instead of dining on game he has killed, or has taken away from some other killer. Photograph by Arthur H. Fisher.

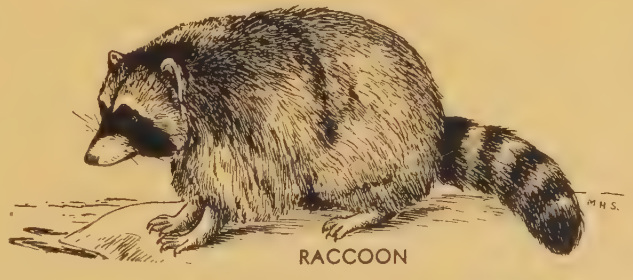


Our Fur-Bearers

The twelfth in Nature Magazine's series of educational inserts

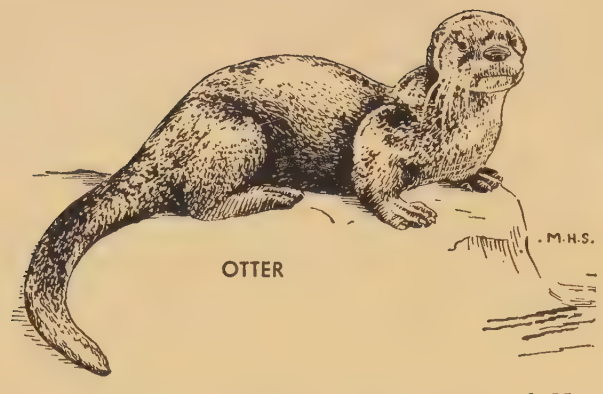
By E. LAURENCE PALMER

THERE is an American industry that in 1938 imported some 43 millions of dollars' worth of materials, while it exported 14 millions. The year before, it imported some 86 millions of dollars' worth, and exported less than 18 millions. It is estimated that this industry put some 78 millions into the pockets of some of the less prosperous of our citizens, in part to adorn the more prosperous. It earned in a year some 9 millions for a special group of farmers who had invested in the business some 50 millions. In good times, the annual turnover in this business in the United States alone is considered to be better than 315 millions of dollars, on which there was a revenue tax of more than 3 millions. This industry, unlike many, is dependent for its existence on a renewable natural resource that can be dissipated and lost, or cultivated and made to prosper. What becomes of it is definitely a responsibility of our people, and this responsibility can best be cultivated by education.

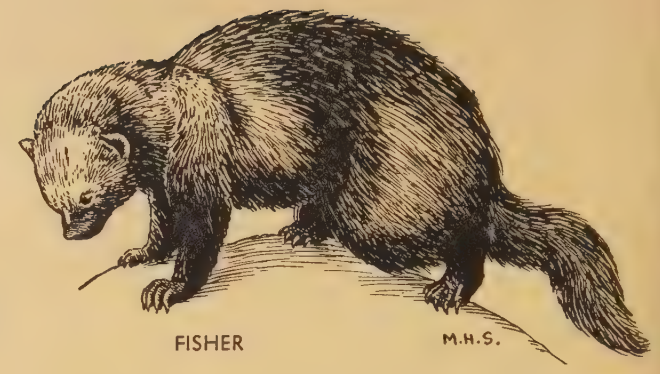


The fur industry, which is dependent upon a steady supply of fur-bearing animals, has been much criticized. There is much anxiety about its future. With justice, it has been criticized for its inhumane trapping practices, which result in the needless torture of wild animals for the production of an unnecessary luxury. Our schools, which have gone into great detail concerning the steps in the production of stockings of silk or of rayon, have not dared demonstrate the commoner practices associated with the initial step in the production of the average fur collar. We have sidestepped, and closed our eyes to the unpleasant aspects of the industry, and at the same time have appropriated large sums of our tax moneys to carry on unwarranted poison campaigns against some fur animals that are also among the best friends of agriculture. We have permitted several of our more valuable species of fur-bearers to become practically extinct over great areas of their original natural ranges. We have condoned the wholesale killing of such animals as the red squirrel for the few cents each that their pelts may bring. One state prints on the license it issues to its thousands of hunters advice to kill all they can of foxes and red squirrels.

In spite of the prevalence of such ill-advised suggestions, it is unlikely that any honest, well-informed person would contend that in the interests of all there should be a general decrease in the population of our fur-bearers. This should be true of the Nature lover, the farmer, the trapper, the dealer in or the wearer of furs, the professional wildlife worker, and the well-informed sportsman. It is difficult to draw fair comparisons in the conditions prevailing in different parts of the country. This is because some states get their statistics by guesses. Others base them on partial but careful records of takes by licensees. Maryland, for example, expresses the opinion that its take of muskrats in recent years has been around two million a



OTTER



FISHER

year, while New York reports only 165 thousand. However, the New York report is based upon the reports of about two-thirds of the State's licensed trappers. It does not include the take of boys who are not required to buy a license, but who are most active in trapping. So, while the Maryland estimate may be too high, it is certain that the New York figure is too low. Trends in takes might become evident where a state's system of making the count is relatively careful and is uniform through the years. It is with trends of population that we are more concerned than with anything else in this matter of fur-bearers.

Another factor should be watched in drawing conclusions about reported takes of fur animals. This calls for a recognition of the areas of the two or more states being compared and, where possible, a comparison of the areas of land suitable for the species in the states. It is well-nigh impossible to get the figures on the amount of suitable land. So the only thing to do is to fall back on total area and not take the findings too seriously. If we use the reported takes of the whole of the United States, we find that the country as a whole produces about one muskrat per square mile. Of course, this figure would not be true for the drier states, nor would it fairly represent such states as Louisiana and Maryland, which have much suitable muskrat land. Using the areas of the states as bases and the reported takes we find representative states showing the following record. Kansas, Maine and New Hampshire produce one muskrat per square mile; Minnesota, 1½; Virginia and New York, 3; Connecticut, 3½; Iowa, 4; Massachusetts, 5; West Virginia, Vermont and Illinois, 6; Pennsylvania, 7; Wisconsin, 9; Michigan and Indiana, 10; New Jersey, 17; Ohio, 30; Louisiana, 50 and Maryland, 170. Obviously these figures are far from reliable but they do show that more accurate records are needed before we can intelligently plan how best to use this valuable renewable natural resource.

MINK

SKUNK

MARTEN

Statistics on furs are complicated by the variability in the price of furs and the corresponding variability in the demand that they be taken. One cannot assume that a low price will lead to a low income, however. New York produces some of the highest quality muskrats in the country. Its furs brought individually on the average more than twice what Louisiana furs brought in 1934 and 1937. Nevertheless, the potential value of the Louisiana fur take rose 75 percent during the period, while the New York increase was only 10 percent.

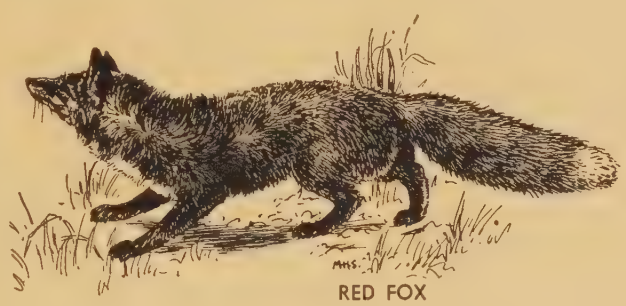
The late Edward Breck pointed out the absurdity of members of humane societies wearing in summer the pelts of animals trapped by inhumane steel traps. In one state, his group carried their philosophy to the people and, over the opposition of the legislature, made it illegal to use steel traps except in the vicinity of farm buildings. The trappers got around this legal restriction by establishing box "tool sheds" wherever they wished to trap, and calling these farm buildings. In another state there was a law requiring that animals be killed humanely, the law presumably referring to the slaughter of domestic mammals. Breck was proceeding to test this law as it might apply to wild animals at the time of his death. Apparently, the issue has not been followed up. Few can doubt the sincerity of many of these people who offer violent opposition to the use of steel traps. The question, if any, centers around how the traps may be eliminated. In New York, it is illegal to use a box trap or wire trap for taking fur-bearers.

Furs are beautiful. They may be produced by animals in captivity that may be killed humanely. There are enormous profits in the industry. The fur-bearers rep-

resent a possible financial reward to persons of low income. Persons of wealth are willing to spend large sums to get the finished product. Surely in this situation there must be some solution that can be worked out with justice to all, and with due consideration for the feelings of animals less intelligent than man.

One of the possible solutions lies in the perfection of cheap traps that will take the animals humanely. Vernon Bailey and others have made distinct progress in this direction.

Another solution may await the development of fur farms and the restriction of the use of furs so that only those species that may be killed humanely on fur farms may be sold. Thirty years ago there were practically no fur farms and yet, in 1936-37, forty percent of the fur produced in Canada reportedly came from fur farms. Skins from fox and mink farms in the United States alone in 1938 represented twenty percent of all the raw furs sold in the country. One farm in Wisconsin of 12,000 acres produces some 12,000 fox pelts a year, valued at $10,000,000, and has produced nearly $18,000,000 worth of fur. It provides employment for more than 400 people. An Ontario mink farm with some 44,000 mink has been in operation since 1933 only. Yet, in 1938, it produced about $1,000,000 worth of fur. As shown in the life history charts, the farming of chinchillas is becoming safely established, with successful farms in various parts of the country. A ready market for these producers of the most highly-priced of furs seems assured.

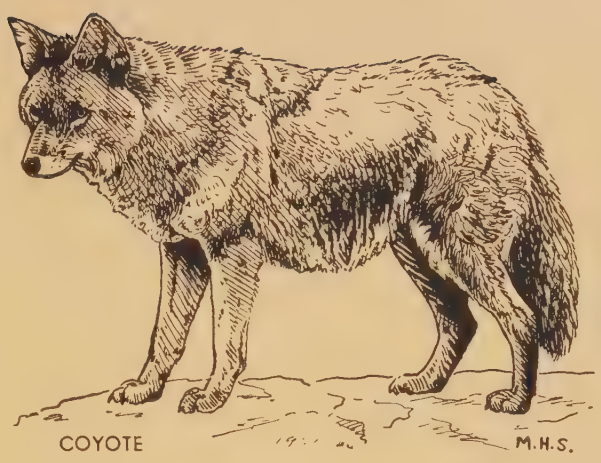


RED FOX

Should these fur farms develop adequately there may be a much needed relief for the wild animals. The farm pelts are taken only when they are in their prime. Through selection of the animals, the pelts have become generally of superior quality. It might seem, then, that forces are lining up for an improvement for the fur-bearing animals which we and our forebears have abused.

There are reasons other than esthetic ones, and those aside from the profit angle, why wild fur-bearers should receive better protection. These concern the value of the living animals as pest destroyers, and in other respects. The great bulk of flesh and animal products that man uses for food will come from the plant-eating domestic

GRAY FOX


COYOTE M.H.S.

animals. Anything that competes with these animals for their food supply interferes with man's interests. The most serious competitors are the mice, pocket gophers, rabbits, and ground squirrels of one sort or another. It would not be abnormal for the small rodents on an acre of land to remove annually one-half ton of dry hay or alfalfa. This would go far to help in feeding the live stock on that land. The greatest mammal enemies of the small rodents usually called mice are such fur-bearers as the skunks, foxes, coyotes, weasels, and minks. If the numbers of these natural checks on the rodents are reduced, the rodents increase, and the forage available for sheep and cattle goes down. It is not surprising, then, that in some parts of the country the coyote is defended, even by the sheep men, as a protector of the forage.

An important aquatic fur-bearing mammal, the beaver, performs a valuable function in flood control by building dams on the headwaters of our streams. These stop the floods at their source and do not require tax money for their construction. They are repaired promptly by the beavers, who do not require emergency funds for maintenance. They may influence considerably the continued flow of streams and the amount of fish life these waterways can support.

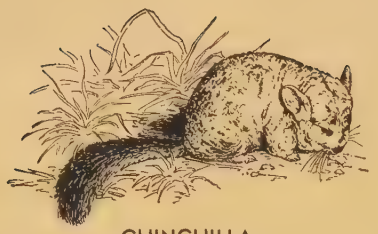
And, further, one may lay aside all economic considerations, everything that has a bearing on the pocketbook or relief from the discomforts of flood, and even his feelings about the inhumane steel trap, and hope that the fur-bearers may be better understood and appreciated. Without a weasel now and then in the side yard, a rabbit on the front lawn, a squirrel up a tree, or the occasional "whicker" of a raccoon in the woods across the road, home would not be home to many of us. The writer flatters himself that there are plenty of others like him who get wholesome satisfaction from living relatively close to these fur-bearing friends, and who are willing to make certain sac- (Continued on page 588)

COMMON NAME SCIENTIFIC NAME	OPOSSUM *Didelphis virginiana*	RACCOON *Procyon lotor*	BOBCAT *Lynx rufus*	MARTEN; AMERICAN SABLE *Martes americana*
DESCRIPTION	Length, to 30 inches, with 15-inch, rat-like, prehensile tail. Weight, to 12 pounds, male, much smaller. Female has brood sac. Ears, naked and black and white. Feet, black. General appearance, furry, grayish white. Eyes, large, dark, and conspicuous in white face. Toes on each foot, 5; widespread, making star-like tracks.	Length, 30 inches. Tail, bushy; length, 10 inches. Weight, 15 to 45 pounds. Sexes, alike. Fur, long and of excellent quality, gray, brown, and black; dull brown at base. Conspicuous black band across face and eyes and in 6 or 7 rings around tail. Feet, with 5, slender, finger-like toes, front and back, yellowish gray.	Length, to 36 inches; tail, 7 inches. Weight, to 39 pounds, but 20 is normal; male, the larger. Sexes, colored alike but paler in winter. Normal color, soft, reddish brown, with cloudings or spots of brown or brownish black all over body. Ears marked heavily on back with black; tail, dark-barred and tipped with black above but not below. Fur, short, sleek. Claws retractile.	Length, total 25 inches. Tail, 8 inches, relatively bushy. Weight, to 4 pounds. Rich, dark brown with irregular patch on throat, though color varies and the throat patch may be white or orange. Ears, white or dull inside. General appearance, much like a squirrel.
CLASSIFICATION AND RANGE	Order Marsupialia. Family Didelphiidae. Only North American marsupial. New York west to Iowa, south through central Mexico, and along Atlantic Coast from southern New England to middle Florida. Introduced and established in southern California.	Order Carnivora. Family Procyonidae. Related to bears. From Gulf of St. Lawrence, southern Quebec, Ontario and Manitoba, and southeastern British Columbia south to Gulf of Mexico and South America. Absent from northern Rockies and drier parts of Great Basin, including most of Montana, Idaho, Wyoming, Utah, and Nevada, and W. Colorado and N. W. New Mexico.	Order Carnivora. Family Felidae. All of United States, except parts of Northern Plains region, south through Mexico except the southern quarter and except the highlands of central Mexico. Extirpated in all thickly-settled sections.	Order Carnivora. Family Mustelidae, weasel-like mammals. Through wooded Canada and Alaska, formerly south in Alleghanies to West Virginia, in the Rockies to Colorado and in the West Coast ranges to central California; also groups in Colorado, and northern New Mexico.
LIFE HISTORY	About 2 weeks after adults mate, up to 18 young, each smaller than honeybee, about ½ inch long with ⅛ inch tail, are born, make their way to brood sac, and attach themselves to teats; some die if not enough teats. Increase size ten-fold in one week. In 4 weeks, may stick heads from pouch; in 5, may leave pouch temporarily; and in 8, shift for themselves. May breed at 1 year. One or two litters a year; maybe more in South.	Probably monogamous; mates in February, and 2 to 6 young born 63 days later. Male may help in rearing young, though in captivity male may kill young. Young, blind for 3 weeks; suckle about 2 months; remain in family circle through winter. May breed when 1 year old, while family is still a unit, or may wait until new litter of young forces them from home den.	In North, mates probably in late February or early March; 2 to 4 young, small, blind and helpless at birth, born in April or May. Den in a standing hollow tree, in or under a fallen log, or in a slashing or thicket; lined with dried leaves and moss; kept clean. Not known whether male shares in caring for young.	Possibly pair, mating in January; 1 to 5, blind young, born in grass-lined, hollow tree or burrow 100 days after mating; gestation may be delayed to 8 months. Young, reared by mother only, suckled about 5 weeks. Not sociable animals; tireless hunters of the treetops night or day, ranging over at least 2 square miles. One annual litter when conditions are favorable. No hibernation.
FOOD AND OTHER HABITS	Food, almost anything organic in nature but prefers birds and eggs; persimmons a favorite fruit. Climbs trees readily with help of tail and feet. May threaten fight if cornered but more likely pretend death. May sleep long in den in bad weather. Den not clean. Usually active throughout year; usually nocturnal.	Food, insects, aquatic animals, frogs, corn, vegetables. Den, preferably high in hollow tree, but sometimes cave in cliff. Does not store food; may hibernate during cold weather. Highly inquisitive and sociable. Desperate fighter when cornered, but easily tamed if caught young. Although it washes food, living quarters not kept clean.	Shy and furtive in behavior, rarely seen, partly because of nocturnal habits. Able hunter of small mammals and ground birds, and sometimes even kills animals the size of sheep and deer. Occasionally feeds on fish, crayfish or frogs.	Squirrels, rabbits, birds, mice or eggs, or any animals that they can overcome. About the only protection a squirrel has is to get into a small hole which marten cannot enter, since marten can outleap and catch a squirrel in the treetops. Generally found in evergreens; also in second-growth deciduous forest.
RELATIONS TO MAN	Enjoyed as food by some people. Undoubtedly a pest to poultrymen and fruit farmers, but also provides sport for hunters and destroys mice and many insects. Fur take in New York State increased from 1,086 in *1927* to 2,908 in *1936*. Price in *1923*, $1. Ranks among first six species of the fur-bearers.	Valuable fur-bearer, take rapidly decreasing in New York State (from 40,908 in *1927* to 26,921 in *1936*). May take corn and poultry from farmer but probably compensates in destruction of mice and insects. Prime northern pelt, *1919*, $9; *1938*, $3.50; southern, $6 and $1. Durability, 65% of otter.	In Southwest, serves as effective control of rabbits and small rodents. Possibly a menace to smaller farm animals when wild prey is not available. Flesh edible by man. Prime northern pelt, *1919*, $4.50, *1938*. $1.50; southern, $1.75 and $0.50. Durability, 25% of otter.	Valuable as destroyer of injurious mice and other rodents, but also enemy of useful small birds and mammals. Valuable fur-bearer now becoming scarce nearly everywhere. *1923* New York take, 300; *1936*, 102. In good country, 6 per square mile would be a high population. Now protected in New York.

FISHER, PEKAN *Martes pennanti*	MINK *Mustela vison*	WEASEL *Mustela cicognanii* and kin	OTTER *Lutra canadensis*	COMMON SKUNK *Mephitis mephitis,* and related forms
Length, total 3 feet. Tail, 14 inches. Weight, to 18 pounds. Dark brown to blackish, with legs and tip of tail black. The female is the smaller and the general appearance is that of a long-nosed, black cat. Possesses great agility and strength, particularly active in the treetops.	Length, to 25.5 inches. Tail, 8.5 inches. Weight, males to 3½ pounds; females, to 1½ pounds. Tail, bushy. Sexes, colored alike, a dark, rich, brown with white under chin. Nose, pointed, and ears, small. Runs by rapid leaps. Toes, 5 on each foot. Scent glands, well developed.	Length, 11 inches (male), 9 inches (female). Tail, 3.2 inches (male), 2.8 inches (female). Toes, 5 on each foot; soles of feet, furry. Soft, close underfur and glistening chestnut outer hairs. Brown above and whitish beneath; everything except black tail-tip white in winter over most of range. Strong, disagreeable odor. Sexes, colored alike, and young like adults.	Length, 4 to 5 feet with 1-foot tail. Height, 7 to 8 inches. Weight, about 20 pounds. Feet webbed, and soles of feet hairy. Each foot with 5 toes. Tail, strong and muscular. Fur, rich, glossy brown; gray on lips and cheeks and lighter gray-brown underparts. Sexes, colored similarly; little seasonal or age variation.	Length, 24.5 inches. Tail, 7.5 inches (male), 6.6 inches (female). Weight, to 10 pounds. Foreclaws good for digging. Sexes, superficially alike, either all black or black with conspicuous white stripe down back and tail; market value of pelt decreases with abundance of white. Strong, repulsive scent from anal glands.
Order Carnivora. Family Mustelidae, with the weasels. North, mainly north of Gulf of St. Lawrence, to N. Quebec, N. Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia, south in mountains to central California. Formerly, now very rarely, in northern Appalachians. Absent on plains of southern Canada and northern United States. Found in dense wooded areas.	Order Carnivora. Family Mustelidae. Related to the weasels, skunks and otters. Through most of Canada and Alaska except extreme northern treeless border, and south through most of United States except Texas, New Mexico, Arizona and southern Nevada and California.	Order Carnivora. Family Mustelidae. Related to the otters, skunks and minks. Just south of the Great Lakes almost to northern border of the continent, west to the Pacific and south along the Rockies and Sierras to central Wyoming and central California. Place taken by other species in south and most of west.	Order Carnivora. Family Mustelidae. Nine species and subspecies recognized. Related to minks, skunks and weasels. Through Canada and Alaska except northern parts, and south through United States except southern Texas, southeastern New Mexico and southern Nevada and California.	Order Carnivora. Family Mustelidae. Related to minks, otters and weasels. Southern half of Canada and south nearly throughout United States except for southern tip of Florida, and parts of coastal plain.
Possibly pair, mating in early March, with 1 to 5 young, born 60 days (some claim nearly 1 year) after mating; reared by mother only. One litter annually. The family breaks up early. Home, a series of dens often high in hollow trees, with 4- to 5-inch entrance. May range over a territory 8 to 10 miles across. Not sociable. May give growl, snarl, spit or mournful cry.	Mates in February or March; both males and females take one or more mates. Males fight fiercely for mates. Young born 50 to 60 days after mating, sometimes much longer, 3 to 7, blind 3½ to 4 weeks after birth, and helpless. Leave den, usually at end of a tunnel 4 inches in diameter, when 6 to 8 weeks old. One litter to season, and family may remain together for first summer.	Mates probably in July, and later (sometimes 8½ months) 4 to 8 young are born; blind for 5 weeks; weaned, at 6 weeks; sometimes cared for by both parents in hidden den lined with fur of animals which have been killed. Will defend young at risk of own lives. One litter a year, and den is clean and free from excrement.	Probably mates for life, breeding in late February. Young, born about 60 days after mating. Litter of 1 to 3 young, which are blind for a few weeks and suckled by mother for 4 months. Family stays together first year; both parents help in rearing young in admirable family life. Lives in den in bank or hollow log.	Mates February or March after family of preceding year breaks up. In 9 weeks, 4 to 10 naked, blind, almost helpless young are born in den which may be occupied by other animals. Nurse for 6 weeks. Male may rejoin family after young are partly grown and when young become partly independent by July or August. Male does not provide for young in earlier stages.
Food, such animals as hares, martens, squirrels, mice, foxes, porcupines and birds of almost any sort that may be captured. Hides surplus food supply and seems to show signs of mischievousness. Does not burrow as do many of its close relatives. Obviously has certain beats that may be followed day or night.	Food, mostly mice, rats and fish. Relish poultry, and may be enemy of marsh-dwelling birds; also eat young snapping turtles, which prey upon birds and fish. Probably do not kill wantonly; and although can climb, does not do so often. Preys on cotton rat in South and on rabbits, which are enemies of agriculture. May (usually not) live in harmony with muskrats.	Food of 360 individuals (Hamilton): 34.5%, field mice; 13.1%, rabbits; 11.3%, deer mice; 11.2%, shrews; 6.7%, rats; 3.6%, chipmunks and kin; 3.2%, birds, frogs, and snakes; and 16.4%, undetermined, but chiefly mammals. Among 500, there was no evidence of blood sucking. Active mostly at night but seen in day and through year.	Food, mainly fish and crayfish. Occasionally kill muskrats, ducks, young beavers, birds, and poultry; range over a 50-mile territory during activities extending through year and during day or night. Apparently can adjust to varying light and temperature conditions readily. Match for an average dog. Give off offensive odor.	Food: 414 analyses show 41.3%, insects; 22.1%, fruits and berries; 14.1%, mammals, chiefly mice; 12.9%, grains; 5.4%, carrion; 2%, birds; 2.2%, unidentified. Female seeks blood about time young are born. Largely beneficial. Destroys white grubs and pests of hops; also mice, eggs of turtles, and potato-beetles.
Most valuable fur-bearer, the yield for entire range averaging around 8 or 9 thousand a year for some 70 years but rapidly dropping. The take in New York was in *1923,* 35; *1936,* none. Must be acknowledged as great destroyers of game and of small fur-bearers. Pelts have brought as high as $150, though average is very much lower.	Value of fur more than compensates for game destruction. Decreasing rapidly in New York State (9,612 in *1927* to 5,608 in *1936*). One of most valuable fur-bearers, can be reared in captivity. Prime northern pelt, *1919,* $12; *1938,* $10; southern, $5, $4. Farm pelts constitute about 40% of annual American crop. High in recent years, $25. Durability, natural, 70%, dyed, 35% of otter.	Splendid destroyer of mice and other rodents, killing millions of rats and mice yearly. Reputed to break up grouse nests. Pennsylvania has spent half a million dollars ($80,000 in *1937*) in bounties, at $0.50 to $1 a head, and number taken increased. Prime white pelts brought $2 in *1919,* $0.30 in *1938*; brown pelts, $0.20 and $0.45; New York production, *1923,* 3,000.	Valuable fur-bearer which has been trapped to practical extinction (1,135 taken in the State in *1928,* and the number decreased to 163 in *1936*). Fur is most durable of all furs. Prime northern pelt, *1919,* $25; *1938,* $14; southern, $7.50 and $5. Durability, natural, 100%, plucked, 95%.	Was used as food by Indians. New York supply is steadily on decrease (300,000 in *1923* to 42,669 in *1936*). Reported to break up grouse nests. Value of skunk to man much more than compensates for the damage it causes to poultry and game. Prime northern pelt, *1919,* $6; *1938,* $1.50; southern, $4 and $0.60. Durability, 70% of otter. Trade name, Alaska sable.

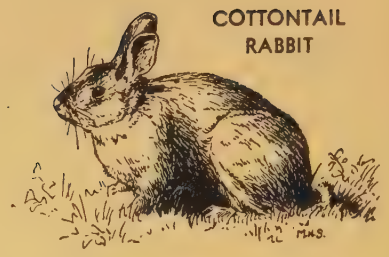
COMMON NAME SCIENTIFIC NAME	COYOTE *Canis latrans*	RED FOX *Vulpes fulva*	GRAY FOX *Urocyon cinereoargenteus*	BEAVER *Castor canadensis*
DESCRIPTION	Length, snout to tail-tip, about 4 feet, over ⅓ tail. Average weight, males, 26 pounds; females, 22 pounds. Ears, large, 4 inches long. Color, pale brown, sprinkled with gray or black or sometimes white, with underparts nearly white and ears darker. Fur, of good quality in season.	Length, to 41 inches. Tail, 16 inches. Weight, to 14 pounds. Males, larger than females. Tail, bushy. Ears, large and pointed. Nose, pointed. Sexes, colored alike a golden yellow-brown; or reddish above and white beneath, with white tip on end of tail, and black legs. In young, black on muzzle and back of ears. Several phases, including black.	Length, 40 inches. Tail, 12 inches. Weight, to 8 pounds. Sexes, about equal in size and in coloration. "Pepper and salt", black, and gray above, with reddish brown along the sides and gray and tawny beneath. Tail, black-marked. Fur, shorter and generally inferior to that of red fox.	Length, 43 inches. Tail, 16 inches by 4½ inches, broad and paddle-like. Weight, to 60 pounds or more, but average nearer 30 pounds. Front feet, with 5 toes; hind feet, with 5 webbed toes. Brown, with beautiful, soft, close underfur. Sexes colored alike, with little seasonal or age change.
CLASSIFICATION AND RANGE	Order Carnivora. Family Canidae. North to Lake Michigan, southern Mackenzie, N. British Columbia, middle Alaska, south to Central America. Range, larger than originally, mainly by extension northward from Great Plains and Great Basin. Individual range, around 6 square miles. Essentially, animals of open country.	Order Carnivora. Family Canidae. Related to dogs and wolves. All of wooded Alaska and Canada south throughout United States except for Pacific coast strip and southern Gulf States and parts of Southwest.	Order Carnivora. Family Canidae. Related to dogs and wolves. New Hampshire and New York to Minnesota, south to central Texas, thence north to Colorado and Utah, south to southern California, north along coast to Oregon. Individual range one or two square miles.	Order Rodentia. Family Castoridae. Canada and Alaska except northernmost areas, and (latterly) the south central plains. Extending south in U. S. to Mexican border, except S. Nev. and S. California; and to Gulf, except Fla. and S. E. coast region. Extirpated from much of plains, Mississippi Valley, and settled East. Now being restored locally.
LIFE HISTORY	Probably pairs for life. Mates in January and young born 63 days later, 3 to 10, blind but furred. May be taken from den at 3 weeks and at 6 may venture out on own and run with parents by July. Family together at least until early fall. Two litters a year rare. Breeds at 2 years. Lives, if fortunate, probably about 10 years.	Strictly monogamous. Mate in February or March; 4 to 7 young born 51 days later. Blind for 8 or 9 days and remain in den 3 or 4 weeks; then may come out and play but retreat to safety until normally about 3 months old. Males feed females and the family, and lead enemies away from dens by exposing selves at risk of life. Family life, exemplary. Den, clean.	Ideal family life. Mates in January; young born 50 to 60 days later in clean den in hollow log, cave, or tunnel; blind and helpless at birth and take solid food at about 6 weeks of age, when father is permitted to rejoin family circle. Family breaks up in August or September though parents stay together through year. Unlike red fox, gray fox has winter den.	Apparently mates for life, breeding early in year; young born 3 months later, 2 to 5 in number. At age of 1 month young eats and seeks solid food; may cease nursing when 6 weeks old, though family may stay together for 2 years. Young animals become sexually mature when 3 years old and establish own homes. Surplus males crowded out of community.
FOOD AND OTHER HABITS	Food, a variety of plants (mostly fruits), and animals but mostly animals. Probably worst enemy of gophers, prairie dogs and other small animals that feed on forage needed by domestic stock. Animals are caught by stalking singly or by hunting in packs, in this way catching more fleet jack rabbits and hole-dwelling ground squirrels. Speed, 24 miles an hour.	Food, principally rodents, but prey also on birds and game. Eat carrion, fruit, vegetables, and a variety of materials; store food more than do gray foxes. With gray fox is reported to break up grouse nests. Does not climb trees as does gray fox. Remarkable sense of smell, good sight, excellent hearing, intelligence, and endurance.	Eats almost anything—poultry, game, mice, mushrooms, fruits, vegetables, insects, and carrion. Does not store as much as does red fox but climbs trees better and considered by sportsmen to be worse enemy of game. Lacks rank odor, and also endurance, of red fox, and takes to trees when pursued by dogs. More nocturnal than red fox and less intelligent.	Food, probably exclusively plants, largely bark of softwoods felled near shore, cut up and stored under water for use in winter. Den, a house surrounded by water, of sticks and mud, with underwater entrance, a large, ventilated, clean room with nest of dry materials. Water level is maintained by dams of sticks and mud kept in order by whole community.
RELATIONS TO MAN	Economic status is debated but service in destroying competitors of live stock for forage cannot be overlooked. Known to kill sheep but may be a lesser factor in this than domestic dogs. May kill deserted newborn calves or colts and, when driven by hunger, may overcome weakened deer. Widespread poisoning campaigns, generally not justified.	Decreasing slowly in New York State (from 35,658 in *1927* to 10,593 in *1936*), without legal protection. Silver fox, a color-phase of red fox, is raised on farms. Valuable because of destruction of harmful mice. Prime northern pelt, *1919*, $20, *1938*, $4; southern, $6 and $2. Average ranch silver pelt brings about $45. Durability, 40% of otter.	Numbers slightly on increase in some parts of New York State (from 2,338 in *1927* to 4,247 in *1936*). Probably enemy of game, but partly offsets this by destruction of mice and other pests, and no worse than cats or some dogs as enemy of wild life. Prime northern pelt, *1919*, $4; *1938*, $2; southern, $1.50 and $1. Durability, 40% of otter.	Highly valuable skin, which formerly constituted basis of wealth and trade in this country. Work as agent of flood control has been recognized only recently, and work in delaying water loss in headwater streams may be more valuable than fur. Flesh is edible. Animals gentle and shy. Prime northern pelts brought $18 in *1919*; southern, $14 and $6.

MUSKRAT *Ondatra zibethica*	CHINCHILLA *Chinchilla lanigera*	WOODCHUCK *Marmota monax*	RED SQUIRREL *Sciurus hudsonicus*	COTTONTAIL RABBIT *Sylvilagus floridanus*
Length, to 25 inches. Tail, 10 inches, compressed, scantily haired, and scaly. Weight, 1½ to 2 pounds. Head, rather round. Fur, dark uniform brown above with longer hairs darker and underparts gray. Sexes, colored alike and young resemble the adults. No seasonal change.	Squirrel-like, with body 9 inches long. Tail, 5 inches. Head, rabbit-like. Eyes, large, black. Ears, broad, rounded at tip, nearly as long as head. Moustaches, long, white or black. Skin, thin but strong. Hair, fine, making thick pelt, gray or ash above and paler beneath.	Length, to 27 inches; tail, 6 inches. Males, larger than females. Fur, rather coarse but might be used for decoration. Grayish or reddish brown above or black or, rarely, white with light underparts. Sexes are colored alike but young are not so richly colored as parents. Hind feet, with 5 toes; forefeet, with 4 toes.	Length, 12½ inches. Tail, to 5 inches, bushy. Forefeet, modified for holding food. Red to rusty, with black stripe on the sides and underparts grayish white. In summer, underparts are whiter, ears lack tufts which may be present in winter, and young animals are duller in appearance than adults.	Length, to 15 inches. Tail, 2 inches. Weight, 2½ to 3 pounds. Ears, long. Hind legs, long. Dark brown above, mixed with gray. Top of tail brown, but underpart of tail and general underparts, white. Sexes, colored similarly. Young, with comparatively short ears and a more yellowish brown.
Order Rodentia. Family Muridae. All of Canada and Alaska except northernmost areas and all of United States, except the extreme southeast including Florida, most of eastern Texas, practically all of California and the southern part of Oregon.	Family Chinchillidae of Order Rodentia. Short-tailed chinchilla larger than common chinchilla. Native of the higher Andes from south of Chile to the north of Bolivia. Practically vanished from native range but now domesticated in United States.	Order Rodentia. Family Sciuridae with chipmunks, squirrels and prairie dogs. Mouth of Gulf of St. Lawrence, north to Hudson Bay, upper Mackenzie and central Alaska. In West S. to N. W. Montana, E. Nebraska and Louisiana. In East to W. N. Carolina.	Order Rodentia. Family Sciuridae with chipmunks, woodchucks and prairie dogs. Canada and Alaska except north of tree zone and through northern United States and Appalachians in the wooded area. Represented in wooded West by related forms.	Order Lagomorpha. Family Leporidae. The United States east of Montana and Arizona. Represented by other forms in most of western United States, in parts of Mexico and south to Panama.
Three to five litters a year; the first born in March or April. May be polygamous and young are born about a month after breeding. Usually 4 to 9 young, late summer litters commonly larger than those of early summer. Mothers fight effectively to protect young.	Monogamous. Mates for life, bearing first litter of 1 to 4, 111 days after mating. Young, full-furred, open-eyed at birth; able to run within hour; nursed 45 days but stay with parent 75 days. In captivity, court and mate when 5 to 8 months old, bearing 1 to 3 litters annually and living 8 to 10 years. Males help raise young.	Mates in early spring immediately after hibernation period; young born 4 weeks later, blind, naked, and helpless, about 4 inches long, with ½-inch tails; crawl at 3 weeks; begin solid food at 4 weeks, to play at 5 weeks, then cease nursing. Sexually mature at 1 year. Average weight in March 5 pounds 10 ounces; in September, 9 pounds 15 ounces. Den, clean and dry.	One litter a year, of 4 or 5, helpless young, born in late spring or early summer. Usually mother alone assumes family cares which, in early summer, may consist not only of protection, but concern about teaching to climb, jump, and similar activities. Adults probably do not remain together, though there is some contrary evidence.	Probably promiscuous in mating; breed several times a year, probably four in warmer parts. Young born 30 days after mating; hidden in hollowed, fur-lined form, among vegetation; nest made by mother; 4 to 7 tiny, naked, helpless creatures, each about 4 inches long; by 2 weeks, may run from nest, though may suckle until a month old.
Food, largely plant material, stored at times; also shell-fish, such as fresh-water mussels, and other small aquatic animals. Enemies include minks, otters, hawks, and owls. Live in burrows in banks or in houses made of marsh plants piled high and with a room hollowed from the inside over an underwater and under-ice entrance.	Ground animals, unable to climb but run rapidly and hide quickly. Nests bare, without soft lining. Animals, gentle, affectionate, clean, nocturnal. In captivity, are fed yeast, molasses, wheat germ, oat middlings, peanut oil, soy bean oil, alfalfa meal, bone meal, with carrots thrice and orange juice twice weekly. Daily food ration, about two ounces.	Food, almost exclusively plants, though flesh may be eaten on occasion. Den at end of burrow and above lowest level of burrow. Wastes left in particular place. Active mostly during day but sometimes during night as well. May climb trees; normally escapes by retreating to burrow, but often fights effectively enemies of superior size.	Food, seeds and nuts, fruits, and the like, with also some flesh, birds' eggs, insects, and similar animal matter. Much more a flesh-eater than the gray squirrel and sometimes a great enemy to nesting birds. Great mushroom eater, and stores food. Den or nest not always kept clean.	Food. a variety of plants including herbs, the bark of trees, vegetables, but not fungi commonly. The animals are direct competitors with man for the plants which he wishes to raise for his own use. May be bearers of tularemia, a disease sometimes fatal to man.
Possibly most valuable fur animal; take in New York State dropped from 553,270 in *1927* to 165,825 in *1937*. In *1936* New York produced 3 per square mile; Ohio, 30; Minnesota, 1½. Prime northern pelts sold for $1.25 in *1938*, for $4 in *1919;* southern pelts, $2.75 and $0.65. Durability, 45% of otter. Trade name, Hudson seal, Russian otter, red seal, river mink.	Probably most valuable fur-bearer, a coat of pelts bringing from $20,000 to $100,000. Breeding animals worth, in *1939*, $3,200 a pair. Breeders introduced into United States in *1923* by M. F. Chapman, who started with 18 animals. In *1939*, there were 29 chinchilla farms in California, Colorado, New York and Wyoming.	Great destroyers of forage grasses, and burrows sometimes dangerous to horses, but burrows also permit water to enter the ground and thus help hold soil moisture. Flesh edible, particularly in young animals if musk glands are removed. May be controlled by introducing gas into burrows or by shooting. Wholesale destruction not justified. Durability, 20% of otter.	Not a useful species because of depredation on birds and stored supplies. Skins now sold as fur and flesh is edible. Considered as game in Canada and some states, but animals too small to justify hunting them for food or clothing. Are interesting neighbors because of their noisy inquisitive ways, and as pets are reasonably satisfactory.	A real pest on farms as destroyer of crops; have appeal to hunters, and their flesh and fur have some value. Fur used for trimming and for manufacture of felt hats. Somewhat on increase in New York (take from 797,750 in *1927* to 906,200 in *1933*); by *1936* number had dropped to 597,966. Durability under 5% of otter. Trade name, electric seal.



CHINCHILLA

WOODCHUCK



COTTONTAIL RABBIT

(Continued from page 583) rifices to guarantee that such pleasant experiences be shared by succeeding generations. After all, happiness is the greatest thing in life. It is doubtful if there is much happiness more wholesome and unselfish than that of sharing with neighborhood wildlife in an understanding way their problems of survival, of food, shelter and recreation.

ACKNOWLEDGMENTS

This article is based on a similar one by the author published as a number of the Cornell Rural School Leaflet by the New York State College of Agriculture at Cornell University. Modifications felt to be improvements have been made to that leaflet. Appreciation is expressed to the College for permission to revise the material, and to the books and pamphlets that were used to supplement the author's personal experiences. Suggestions for school room activities appear on the School Page. The illustrations are by Hope Sawyer. The books most commonly used are as follows:

American Mammals, by W. J. Hamilton, Jr. The McGraw-Hill Book Company, New York City, 1939.

Furs, Leaflet No. 230, Ladies' Home Journal Clearing House of Consumer Information.

Lives of Game Animals, by Ernest Thompson Seton. Doubleday Doran, 1909.

The Biological Survey, United States Department of Agriculture (now Interior Department), issues useful bulletins for farmers on the raising of fur-bearing animals for profit, and with their habits in the wild, with special numbers on foxes, skunks, moles, minks, beavers, muskrats and others. These have been consulted and used where the information was appropriate.

In amplification of the preceding paragraphs, the following instructive publications are cited:

Fur Bearing Animals, A monograph of North American Mustelidae, by Elliott Coues. Misc. Pub. No. 8, U. S. Geological Survey, Dept. Interior, 1877.

Fur-Bearing Mammals of California, Their Natural History, Systematic Status and Relation to Man, by Joseph Grinnell, Joseph S. Dixon, and Jean M. Linsdale. University of California Press, Berkeley, California, 1939. 2 volumes. (With special reference to California conditions, but all species and the group treated from a broad standpoint.)

Our Disappearing Fur Bearers, by Edward A. Preble, Nature Magazine, Dec. 1927. Reprinted, 24-page pamphlet. (Biography, Conservation.)

Fur Animals of Louisiana, by Stanley C. Arthur. Bull. 18, Louisiana Dept. of Conservation, New Orleans, 1928. (Valuable book; historical, authoritative.)

Foods of Some Predatory Fur-Bearing Animals in Michigan, by Ned Dearborn. University of Michigan Press, Ann Arbor, 1932.

Fur-Farming for Profit, by Frank G. Ashbrook, The Macmillan Co., New York City, 1928. (Current review of the industry.)

Silver Fox Farming, by Frank G. Ashbrook, Department of Agriculture, Bull. No. 1151, 1923. (Other editions.)

A Survey of the Animal Fur Catch of the United States. From Section Fur Resources, Bureau Biological Survey, U. S. Dept. Agriculture. (Figures for 27 states.)

Wild Animal Pets, by William and Irene Finley. Charles Scribner's Sons, New York City, 1928. (Accounts wild pets in household.)

Can We Save the Mammals? By Osborn and Anthony, Natural History, New York City, Vol. 22, pp. 388-405, 1922.

BEAVER

MUSKRAT

RED SQUIRREL

A NATURE CLASS GOES AFIELD

By GORDON S. WHITE

Photographs by Walter Nase

If you should happen to be in front of the Belleview Junior High School in Belleview, Florida, and see a group of boys piling into a truck, it would probably be Newton Perry's Nature class on its way afield. Or if you came upon a group, armed with a varied field equipment, making its way through the woods and led by a husky man, it would probably be Newton Perry, principal and Nature teacher of the Junior High School, and

Down on their hands and knees, the boys investigate the habits of the ant lion and his pit that catches the ants that provide him with food. Blowing into the cone-shaped holes, the boys bring the ant lions up for a look. Or one bright-eyed youngster spots a wood beetle. The specimen is taken into captivity and later Mr. Perry gives a short and popular talk about it. Afterward the beetle goes into the collection of the class for further observation.

his select crowd of youthful, exuberant Nature enthusiasts.

It all started when Mr. Perry found how enthusiastic members of his Boy Scout troop, and the youngsters in his Saturday club of boys of non-Scout age, were about meeting Nature on her own terms and learning her secrets in the open. He decided this would work in school as well. It has.

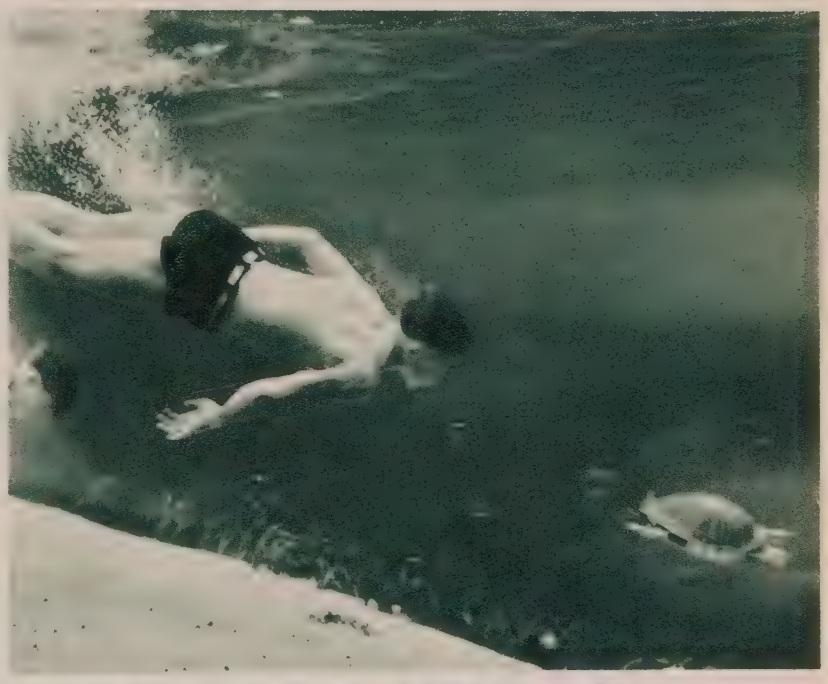
"I just try to make it as interesting as I would want it to be if I were taking the course myself," Mr. Perry says of the educational philosophy back of this activity. And any one of the boys will tell you that he succeeds in doing so.

The class is open to any boy in the seventh, eighth or ninth grade who has an average of C in all his work and can meet a few special requirements. A boy must hold an American Junior Red Cross first-aid certificate; be able to pass the Red Cross swimming test; know how to row and handle a boat; know a few simple rules of the woods, and have the desire for this kind of knowledge and experience. Girls, Mr. Perry says, just do not seem suited to some of the demands of this program. The course is elective, and a boy to stay in it must be on his toes and work. From fifteen to twenty boys qualify each year, and poor work means that the member of the class is promptly dropped.

The real fun begins when the boys climb into the truck, which belongs to the Saturday Boys' Club. The expedition may be made during school hours, but it is satisfactory with the boys if it is any time. A full week-end trip is a special treat.

Scout leader, teacher and swimming

A float at Silver Spring serves as an outdoor classroom. Mr. Perry points to something in the crystal-clear water that looks like a promising matter for investigation. Over one of the boys goes and usually, in thirty or forty seconds under water, is able to catch the turtle. Several members of the class may aid in bringing up a mass of raccoon-tail weed that contains many specimens of crustaceans. Shrimp and crayfish hide in these weeds and are sometimes gathered to attract and feed the fishes.



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coach, Mr. Perry brings special abilities to this work. These qualities, coupled with that rare ability to inspire and lead boys, make these Nature jaunts afield a valuable youthful experience.

In the woods the class studies what it finds. This may be anything from a wood beetle to a snake. Mr. Perry seeks to give the boys that confidence in the outdoors that is born of knowledge.

"I don't try to wear the boys down with all the scientific names of the things we see," he says. "After all, they are only junior high youngsters, so I try to introduce them to the things we find, and they can pursue things further as they wish.

"One day in the woods a boy shouted that a snake was about to strike him. I found that it was a harmless hog-nosed spreading adder, which offered opportunity for a practical lesson. I told the boys we had one of the best bluffers going, and, to show them why, I teased the snake with a stick. It struck like a rattler. Then, finding that didn't scare me, it flattened its head like a cobra. Accomplishing nothing, it gasped as though in convulsions, and finally rolled over on its back to play dead.

"The boys missed no part of the show and thought the snake was done for. I told them to get out of the way and wait to see what would happen. In a few seconds the hog-nose looked around to see if the coast was clear, then started to crawl away. I told the boys to jump from behind the bushes and see what would happen. The snake played dead again. Some of the boys were still not convinced the snake wouldn't bite and poison me, so I picked our specimen up and tried to make him bite, even putting my finger in its mouth. After warning the boys not to try such an experiment with snakes they didn't know, we moved on to the next adventure."

The crystal-clear waters of nearby Silver Spring furnish ideal hunting grounds for specimens, and this is a favorite spot for the class. Diving under water, they come up with a variety of aquatic plants and animals. This is sorted out on the raft-classroom and studied right then and there.

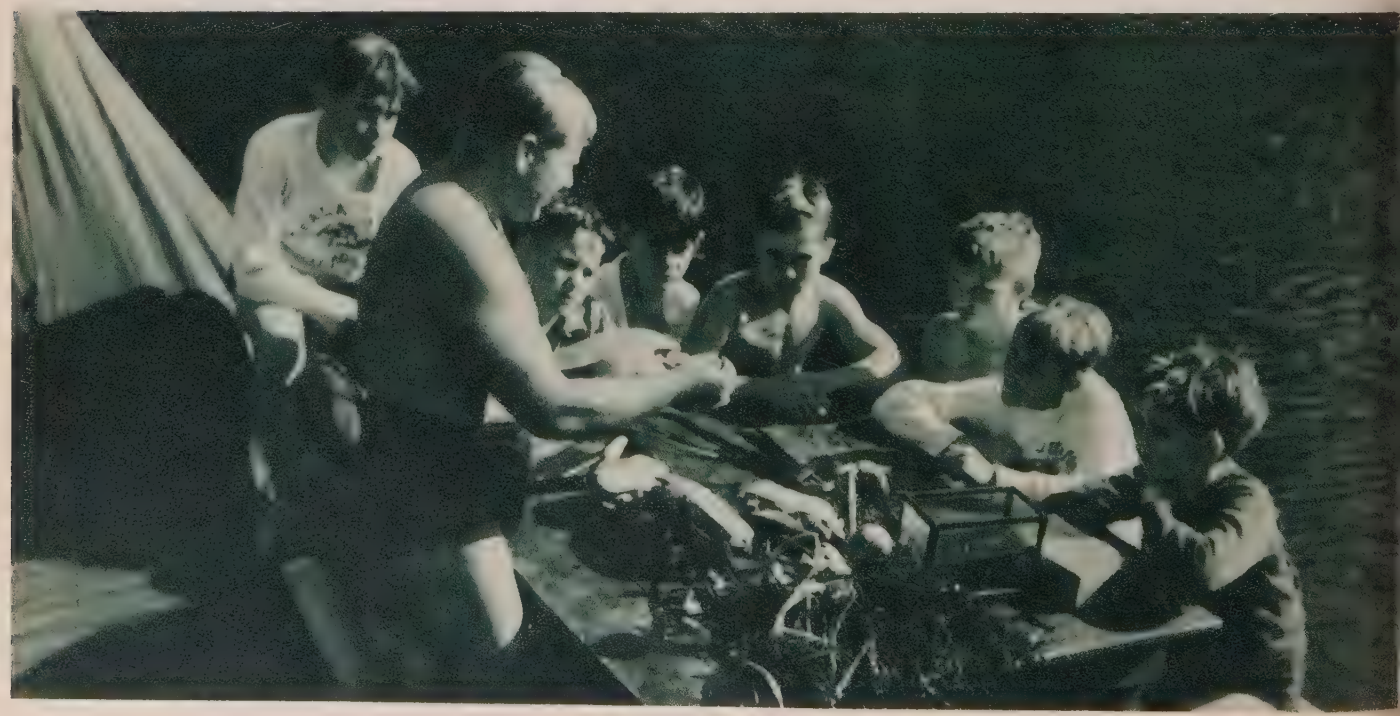
"We get intimate with fish life under water," says Mr. Perry. "One day six of the

boys were under with me when we spotted a red-breasted bream guarding her nest of eggs. I motioned to the nest and we paddled around watching the bream chase away other intruding fish. We threw small pebbles into the nest, watching her fight these until she realized they were no menace. Thus we had a lesson in one of Nature's struggles for existence."

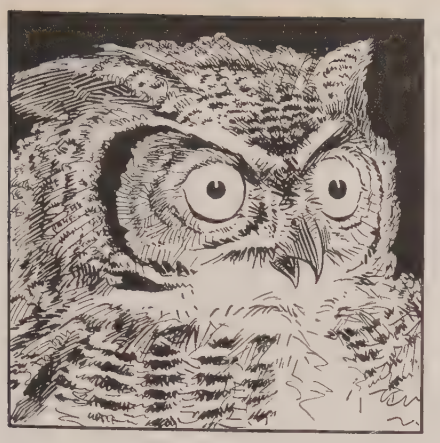
Florida offers a wide variety of material for study through the method of Mr. Perry's class. Whether or not the boys follow up their interest in Nature professionally, they have gotten a rich experience from their school.

"There is a special value in becoming aware of the wildlife around one," says Mr. Perry. "And these boys, in doing so, are also having a good time. And so am I."

The boys learn how to distinguish between poisonous and non-poisonous snakes. Mr. Perry used the harmless and common Florida banded water snake to illustrate his points and to show interesting characteristics and bring out the value of many reptiles. A specimen of Florida terrapin is being given a meal to show that it is a vegetarian. From the rapt expression on the faces of the boys it is plain that Nature study is a fascinating subject.



As We See It



IN THE MIDST OF CARNAGE

We received, the other day, the *Journal of the Society for the Preservation of the Fauna of the Empire,* for August, 1940, publication of an organization of British wildlife conservationists. We felt much as did a fellow American, a member of the Society, who sent in her subscription for two years and "a bit over" and who wrote: "It was strange and wonderful to get the *Journal*—right in the midst of the awfulness of this spring. Do keep it up! We may get satisfaction from saving animals, since we haven't advanced any in preserving our own lives."

Commenting upon this word of encouragement, the editor of the *Journal* wrote: "One cannot expect much progress in the development of fauna preservation, at any rate on international lines, while the nations upon which we had relied, as being civilized, are staging, as destroyers or victims, the most striking exhibition yet seen of 'Man's Inhumanity to Man'. It may seem to be not worth while to try to make the voice of wildlife conservation heard above so hideous a din of war. And perhaps, at the moment, it would be waste of time to protest against the use, by speakers and writers castigating the aggressors, of such misplaced metaphors as 'Jungle Law', for example. If men would but follow the lessons of the jungle the world would be a happier place for men to live in. So far those lessons have not been learned and we have to accept the fact that men are, for the most part, too occupied in killing or being killed and in enslaving and being enslaved to give heed to the object for which this Society exists."

The British Society, however, is carrying on; its membership remaining loyal. And in so doing it is an example of the need of holding fast to those things that are synonymous with civilization in a world gone mad with hate and lust for power. There is always hope so long as a people keeps its sense of proportion, its sense of humor and its sense of values. These are great assets in the fateful days that are facing Britain—and all free peoples. They are weapons forged in the fires of democracy and are not found in the arsenals of the dictators, who are, therefore, weaker than they know.

In such times as these there is an even greater need for interest in and concern for the resources with which Nature has endowed us. Esthetically, wildlife takes on added value. Knowledge of it offers surcease from the mental strain of a dislocated world. It provides escape—if you will. Much wildlife has certain economic significance, although as a source of food it represents only a last resort and adequate stocks should be maintained and increased.

In times of peace and complacency, the conservation of our natural resources in soil, forests, water and wildlife can never assume the dramatic importance that it takes on in time of stress. If a national knowledge of conservation and its meaning is of peacetime significance, it is of even more vital concern in time of war. There is always danger that war, or the threat of war, will obscure such facts. And we may well profit by the British example while we set about to arm ourselves against possible aggressors.

There is, therefore, a greater responsibility in these days upon organizations dedicated as we are to conservation of natural resources. Those who know and understand Nature's ways are endowed with an appreciation of values that are of fundamental importance to the future of mankind.

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MASSACRED ★★ FOR MILLINERY

"It's up to you, ladies. Solely because women will buy hats trimmed with plumage, certain of our birds are nearing extinction; if they declined to buy such hats there would be no market for the plumage, and consequently no butchery of the birds. The matter rests absolutely with the women."

This paragraph is quoted from an article in *Collier's* in 1910, when the fight was being carried on against ravishing bird life to satisfy the demands of fashion and woman's acceptance of its dictates. The fight of thirty years ago was won, but this paragraph is just as applicable today as it was three decades ago. A cycle has been made in fashion's decrees, and, by subterfuge, evasion and illegal methods, bird life in this country and abroad is again being despoiled for women's hats.

The story of this is told in a bulletin of the National

Audubon Society, written by Richard H. Pough of that organization and entitled "Massacred for Millinery." It was the subject of indignant discussion at the recent annual meeting of the National Audubon Society, and a campaign was launched to close the gaps in existing law and again arouse public opinion as it was once so successfully aroused. This is a campaign in which every conservationist and Nature enthusiast must join.

"A systematic and thorough survey of millinery shops, millinery departments and wholesale establishments dealing with the millinery trade in New York and Philadelphia has revealed a large variety of feathers of wild birds being offered for sale, some openly, some covertly," says Mr. Pough. "More than two hundred different feather samples were purchased, and subsequent classification and study of them by specialists at the American Museum of Natural History shows unmistakably that more than forty species of wild birds are represented among the purchases made.

"Twenty-four different firms were discovered offering condor feathers for sale, either to the public on hats or to the millinery trade in the form of 'raw', undyed feathers. Golden eagle feathers were on sale at thirty places, and bald eagle feathers at a dozen different establishments. Among the other native American birds—all supposed to be on the completely protected list in both states—whose plumage is being offered for sale are the feathers of the whistling swan, osprey and great blue heron."

The list of foreign birds that have been yielding their lives to satisfy the demands of the milliner is a long one. It includes many birds whose numbers cannot stand such wasteful inroads as are now being made. The three species of albatross of the North Pacific, for example, are threatened with extinction at the hands of Japanese plumers. The world's largest flying bird—the Andean condor—seems similarly marked for extinction if women continue to buy hats with feathers as adornment.

When legislation was passed to protect birds from plundering for plumage, the laws had loopholes. Public revulsion against this millinery practice was such, however, that there was no demand, and the weaknesses in the law did not matter so much. They matter now.

Importation and trade in feathers has been facilitated by taking advantage of three major weaknesses in the law. First there is the provision that plumage imported before 1913 is legal. Old invoices are appearing to support the legality of feathered merchandise. The second loophole is that permitting importation of feathers to make fishing flies. There has been a tremendous increase of importation ostensibly for this purpose, despite the fact that there has been no increase in the sales of fishing flies, and despite the fact that the supply of feathers in hand for this purpose is adequate for the needs of several years. The third weakness in the law is the Customs regulation permitting entry of feathers if accompanied by affidavit that they come from domestic birds. This last is susceptible of great abuse since the Customs authorities and the American consuls abroad must work largely in the dark and accept the affidavits.

Investigations prove that in most cases claims that the feathers originate with domestic birds are absurd. Many feathers of the South American rhea, for example, appear on the market, and Dr. T. Gilbert Pearson, in his recent studies in South America, could find no rheas being raised domestically and saw wild birds killed because their plumage had commercial value. Dr. William Beebe, eminent pheasant authority, declares that it is ridiculous to claim that pheasants are being domesticated in the Orient in sufficient numbers to supply more than a tiny percentage of the feathers of these birds that now sprout from milady's bonnet.

"The successful evasion of laws forbidding importation of wild bird plumage has made much more bold the attacks upon our domestic birds," says Mr. Pough. "The eastern demand for the feathers of bald and golden eagles has already stimulated their commercialization. Word has been spread in a number of western states that the eagle feathers can readily be sold."

It is pointed out that one magazine circulating to hunters, traders and trappers carries advertisements offering to buy eagle feathers. A new enthusiasm has arisen for "control" of the golden eagle on the ground that it is a predator; thus it may be killed and its plumage commercialized. The bald eagle, our national bird, is now protected by Federal law, but that does not seem to stop the feather hunters.

This, in brief, is the situation today. What is the remedy? First, of course, is elimination of the loopholes in the law. With twenty-seven years having passed, certainly the permission of sales of feathers imported prior to 1913 is unnecessary. The fishing fly regulation should be repealed. A more than adequate supply of feathers can be obtained from domestically-reared game birds; which is the way this is handled in Canada. Finally, a quota system for importation of foreign feathers based upon the known extent of domesticated stocks abroad should be established.

These are the legal steps, but women hat-buyers hold the whip hand. There are legal and there are illegal feathers. Women may demand proof that the feathers on the hat of their fancy are legal. Some retailers will give this assurance in writing. If they will not, don't buy the hat. If women will indicate a concern on this point the millinery trade will quickly get the idea and the demand for illegal feathers will dwindle. Thus the assertion in 1910 that "the matter rests absolutely with the women" has equal force today. They can, we are certain, be relied upon in such emergencies as this.

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SKIN DEEP

By CY LANCE

The fur on her looks fine—
No finer could cash get her;
But then, somehow, I can't but think
It looked as good upon the mink;
Or maybe even better.

THE CHRISTMAS ROSE BELONGS IN ANY TRUE WINTER GARDEN

PHOTOGRAPHS IN THIS ARTICLE FROM J. HORACE MCFARLAND CO.

Flowers That Defy Jack Frost

By ANDREW S. WING

Garden Editor of Nature Magazine

WE HAVE heard much about "the flowers that bloom in the spring, tra-la-la", but most people are not so familiar with those plants that defy winter's icy hands in the North. After most flowering plants have succumbed to winter, there are a number that reverse the more usual growing cycle, choosing to bloom in late autumn, very early spring, or even during mild spells in the midst of winter, thus becoming of special value.

WINTER HEATHER, OR HEATH, THRIVES IN THE WINTER ROCK GARDEN

Known as *Erica carnea*, it blooms in mid-winter or very early spring, charming with its graceful growth and tiny, rose-colored bells that remain for a long time

RHODODENDRON MUCRONULATA
HAS NO COMMON NAME

Defying frost, it will bloom with the first daffodils and even before the forsythia is awake, its flowers a delicate lavender

A few of these frost-proof plants are North American natives, although most of them are introductions. Practically all can be grown in an ordinary garden in all but the most frigid sections of the country. Tucked away in a corner of the border, a sheltered spot in the rock garden, or in a semi-wild corner, they are worth having if only as curiosities. They have beauty, too, although not of the showy kind found in mid-summer flower borders. Even the most commonplace gardens can be a riot of color with bright annuals during the hot season, but, like the birds that linger with us all winter, it is the out-of-season flowers that may be cherished most of all. Not that they will in any sense displace indoor window gardens, but there is nothing like the thrill that comes from the discovery of flowers in bloom in the open ground during a garden stroll in late December, or on a sunny January day, or when a March blizzard blasts our hope for an early spring. Frost-proof flowers are friends indeed when all the northern world seems cheerless and drab, and only the evergreens are left to remind us of summer's verdure.

First of all come those fall-blooming plants that withstand heavy frost and even a light freeze; those lingerers-on that brighten the days when leaves are falling and the pungent smell of bonfires is in the air. In this group are the new hardy strains of chrysanthemums, the improved wild asters, violets, goldenrods, and a few weeds that may be a nuisance in the summer garden or lawn, but are welcome when everything else has faded. Even a dandelion is appreciated then, perhaps because we do not have to worry about its ripening seed. Lingering on into Indian summer, or even later, these defiant harbingers of winter are about as cheering to the Nature enthusiast as the first blooms of spring. Choicest of this hardy group is, perhaps, the fringed gentian, whose chalices of heavenly blue are sufficient reward for any late autumn walk through a moist meadow or along the edge of a bit of marshland. We found such a spot a few years ago, an unpaved road that meanders through a sparsely settled bit of Westchester County, just outside the limits of metropolitan New York. Now we make a pilgrimage there every fall at gentian time, just after the first hard frost has nipped all tender plants and has painted maples and sweet gums with scarlet and gold. We know this road as "Gentian Hollow", and its exact location remains a carefully-guarded secret shared with only a few trusted and sympathetic friends.

The fringed gentian can be grown in cultivation from seed planted in moist spots alongside a pool or brook.

They are biennials, and not easy to get established, unless they are given just the proper environment. But I have known them to seed themselves in a cultivated garden near Newtown, Connecticut, and to thrive there as though in their wild state. That master of wild-flower gardening, George D. Aiken, now Governor of Vermont, declares that they are easy to grow, but my own experience has not been so happy. Sun, humus, moisture, and yet fairly good drainage are some of the essentials for success with the fringed gentian. They are certainly worth a trial, even at the risk of failure, for one never knows until he tries whether he can have "luck" with them or meet failure.

BLOSSOMS AND BUSH OF SHADBLOW, *AMELANCHIER CANADENSIS*

Out about the same time as the pussy willow, it lights up the barren hillsides with its silvery-white, fuzzy flowers, which are followed with a small palatable fruit known as service berry

After a few really sharp freezes have seared most wild and cultivated flowers, and even the hardiest of the fall-blooming plants are preparing for winter, then is the time to look for witch-hazel. If your eyes are not sharp you might pass by a witch-hazel bush without even noticing that it was in bloom. The sprawly, ghostly-yellow flower of our native witch-hazel, *Hamamelis virginiana,* is not at all showy, but when examined closely it is both interesting and decorative. It grows in open woodlands from Canada to Florida, and eventually may make a small tree, although it is more commonly seen as a tall, spreading shrub. The medical profession attaches no great importance to its curative qualities, but it is well worth owning, if you have a wild corner, because of its habit of late blooming and the curious way in which it pops its seeds.

An oriental cousin, *Hamamelis mollis,* has a showier flower than our native witch-hazel and blooms in late autumn or early spring. It will stand more sun than our species, and is worth adding to your collection if you have space for it. It is now obtainable from most of the nurseries that offer extensive lists of stock.

While on the subject of shrubs, and not because of their blooming season, which is early spring, we may mention two other natives of northeastern United States that have been rather neglected—shadblow, *Amelanchier canadensis,* and spicebush, *Benzoin aestivale.* Shadblow comes about as early as pussy willow and lights up a leafless hillside with silvery-white, fuzzy flowers, which are followed

GARLAND FLOWER, *DAPHNE CNEORUM*

It has a cousin, *Daphne mezereum,* whose reddish-purple flowers are welcome in March

by a palatable small fruit, known sometimes as service berry. It makes a slender tree of medium height, and grows quite rapidly in a friendly location. Spicebush prefers moist woods, but will grow almost anywhere, and is spread from seed by birds. The small greenish-yellow flowers are borne close to the stem so thickly that quite a bright effect is created when they are struck by the rays of the sun through treeless woods. The spicy flavor of leaves and bark seems to repel rather than attract insects, and this feature, added to its habit of blooming so early, make it a desirable shrub for a tall border. It can be pruned back if desired, but its natural spreading form is graceful and attractive.

But to get back to autumn, this is the time when many trees and shrubs bring out flowers in the form of catkins. Prominent in this group are the birches and hazels. Inconspicuous as catkins are, they are none-the-less true flowers, the male and female blooms often borne on separate trees, or on different parts of the same one. Placed in a bud vase indoors, they have a decided decorative value for one with an appreciative eye for growing things.

We have thus far been considering chiefly those plants that are hangovers from the summer garden, or that grow naturally in the woods or, with little care, in a wild garden. It is now time to give attention to those plants that belong in the true winter garden. First in this group, in order of

FLOWERS AND ICE-GARLANDED TWIGS OF THE SPICEBUSH

A neglected shrub of the northeastern states, it likes moist woods but will grow almost anywhere and is spread from seed by birds. Its flowers are small and greenish-yellow, growing thickly close to the stem

bloom, is the Christmas rose, *Helleborus niger,* a low-growing perennial herb of the buttercup family. It has attractive, divided, evergreen foliage, and the anemone-like flowers come in shades of white, pale green, and purplish-rose, all with prominent yellow stamens. The rose shade is rather more pleasing, on the whole, although all are attractive in their way. Slow to become established, Christmas roses are best left alone until the clump becomes crowded. Then it can be lifted and divided. They prefer some shade and protection, and like a moist but *not wet* spot. A fernery that it not too dense is an ideal spot, and the plants relish fertility in the form of rich leaf mold or rotted manure. Try this plant, so well-named for the season.

There are a number of horticultural forms, one of which—*Helleborus maximus*—may bear flowers three to four inches across. The rootstalks of the Christmas rose carry an active poison, which, although comparatively harmless to man, is toxic to insects. The old hellebore of commerce, however, mostly obtained from a related plant, false hellebore, has been supplanted by more modern insecticides. The Christmas rose opens up nicely if cut in the bud and brought indoors. Although the plants are never cheap, they are so desirable and long-lived that they deserve a home in many more gardens. Blooming seasons vary according to variety, climate and season, but they blossom close enough to the holidays to be worthy of the name bestowed on them.

Winter heather or heath, *Erica carnea,* should be in every rock garden or low border because of its graceful, fern-like growth and its habit of blooming in mid-winter or very early spring. The tiny, rose-colored bells hang beneath the stems, and remain for a long time. Of the hardy heathers, I place this one first, not that it is as showy as some of the summer bloomers, but it has a great deal of charm and is not at all difficult (Continued on page 606)

Conservation Comment

"The tendency of redhead ducks to lay eggs in the nests of other birds is apparently an important contributing factor in the present reduced population of that species, according to investigators of the Fish and Wildlife Service, United States Department of the Interior, who have been conducting a series of studies on the breeding grounds of the Bear River National Wildlife Refuge. Lead poisoning acquired during certain seasons in heavily gunned areas was also found to be an important factor in the reduced population."

So says a publicity release of the United States Department of the Interior. No mention is made of the gun as the most important contributing factor in the present precariously reduced state of this species. Nor is mention made of the fact that it is still legal to shoot these waterfowl during the current indefensible sixty-day open season.

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Spessard L. Holland, Governor-elect of Florida, is emphatically dedicated to complete, with all possible speed, the State's part of the program that will establish the Everglades National Park in Florida. Purchases of land, and the exchange of land now in private ownership within the proposed park area, for State land outside, must be carried forward. The Everglades National Park Association warns that the Governor's championship of this program should not be allowed to obscure the fact that funds must be provided by private subscription to acquire land not otherwise provided for, and that much work must be done before this park becomes an accomplished fact.

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The mid-August hurricane caused heavy losses to the huge loggerhead turtles, whose life habits were described in the August-September, 1940, issue of NATURE MAGAZINE. Investigators found that about two-thirds of the season's nests had been made and that some 400 loggerhead nests—representing about 40,000 prospective turtles—were completely destroyed. Bird colonies were also affected, many late broods being lost.

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Census takers have not only been checking up on our human population but on avian numbers as well, at least so far as the rare trumpeter swan is concerned. It was found that there are now at least 212 of these birds, the majority concentrated on the Red Rock Lakes National Wildlife Refuge in Montana and in Yellowstone National Park in Wyoming. The story of this bird and the problems of its restoration is told in the August-September, 1939, issue of NATURE MAGAZINE.

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Four new national wildlife refuges have been established following the approval of the Migratory Bird Conservation Commission. These are the Horicon National Wildlife Refuge near Waupun, Wisconsin; the Parker River National Wildlife Refuge, near Newburyport, Massachusetts; the Missisquoi National Wildlife Refuge, near Swanton, Vermont; and the Lac Qui Parle National Wildlife Refuge, near Ortonville, Minnesota. The Commission approved the expenditure of $279,880 for the purchase of land, which included land to be added to eleven existing refuges in ten States.

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Some indication of the extent of the activity of introducing non-native game birds into the United States may be gained from a survey made by the Fish and Wildlife Service revealing that 544 private game breeders raised ring-necked pheasants last year, 267 raised chukar partridges, and 64 raised Hungarian partridges. This gives new impetus to the perennial argument between sportsmen and naturalists as to the wisdom of introducing alien birds. There is still inadequate information on the results of such artificial building up of game resources with exotic birds, and much ill-advised "planting" of the birds. Far better provide our native birds with the protection and environment they need to survive and increase.

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In normal times the United States imports almost half of the furs sold on American markets, but the importation of furs is now greatly reduced, constituting an additional serious threat to the numbers of American fur-bearing mammals. Estimates of the Fish and Wildlife Service indicate that at least eighteen and one-half million fur animals were trapped in 1939, but officials of the Service believe this figure far below the actual take. Frank H. Ashbrook, who is in charge of the fur resources work of the Service, declares that we are so lax in reporting the fur animal harvest that we do not know the facts with respect to the production and the harvest. He asserts that the demand for furs under present international conditions will mean greater take "unless protective measures are taken to prevent overtrapping." Here is an opportunity for those who preside over what seems to be included under "fashion" to do a patriotic, conservation and humane service by doing without furs.

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Word comes from the Jack Miner Migratory Bird Foundation, Inc., at Kingsville, Ontario, that even more urgent appeals must be made for public support of this conservation work to which Jack Miner has given his life. The exigencies of the war situation have forced the Dominion Government greatly to reduce its subsidy to the Foundation, and the only recourse is to public subscription. It costs Jack $15,000 a year to maintain his sanctuary, so the original government contribution of $4000 a year only carried part of the burden. Jack Miner's work has been widely publicized and is well known, but if you are

not acquainted with it and are interested, write to the Foundation.

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With its November issue the *Alabama Game and Fish News,* hitherto published by the Game, Fish and Seafoods Division of the Alabama Department of Conservation, takes on a new title and added editorial scope. It will be renamed *Alabama Conservation* and will become the official publication of the entire Department of Conservation. Forestry and state park information will be added and the new publication will more adequately tell the story of what Alabama is doing in the field of conservation.

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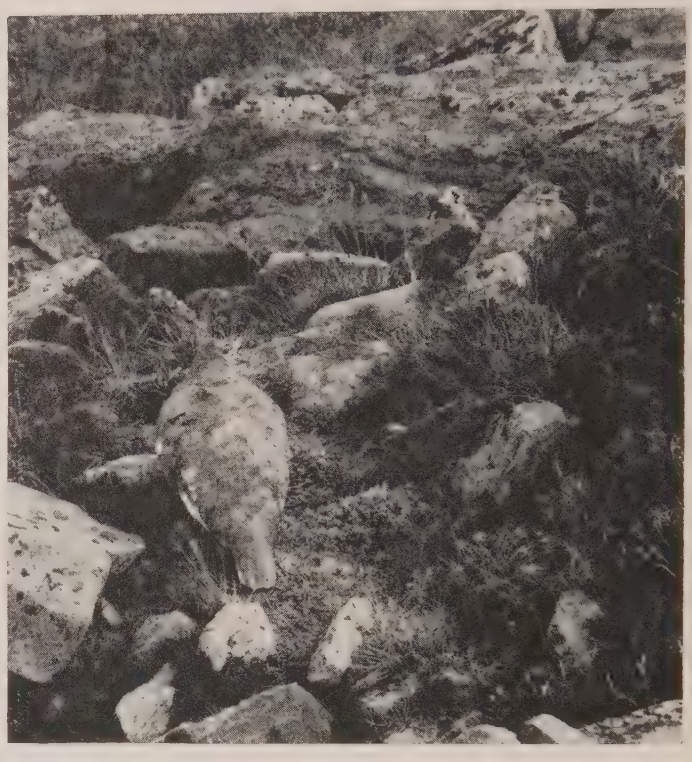
Changeable Birds

By MAUD MATTOX KEITHLEY



OFTEN in summer I have come upon white-tailed ptarmigan, *Lagopus leucurus,* around timberline, and marvelled at their protective, tawny coloring, blending so perfectly with their surroundings, and the dry grass and leaves of their nest. Later in the fall I have seen them with slaty-gray backs slipping in among and over rocks of similar shades, after they had moulted their breeding season feathers.

Their deceptive appearance, however, reaches its height in winter, when the feathers turn nearly pure white.

One fall day I was climbing, off trail, the upper slopes of Pike's Peak, and noticed a moving shadow. It was made by a ptarmigan, squatting in the rocks, which were partly covered with snow. I did not see another bird near, so thought this one must be hurt, as the birds keep in coveys of twenty up to one hundred in winter, and mates are found together at all other seasons.

I shot it with my camera, then went up almost close enough to touch it. With a loud cackle it flew a short distance, and ran and squatted, walking with great ease over the snow on its densely-feathered feet. When the film was developed, imagine my surprise at finding two ptarmigan in the picture. The second bird had kept its place, in spite of my intrusion.

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To The Mountain Lion

By CHARLES KINGSLEY JOHNSON

Ruler of mountain, wood and glade,
With super-power and agile bound,
No darkling gorge nor steep forbade
You a retreat or hunting ground,
But where your foot prints fade
Along the trails you used to tread,
The timid deer roams unafraid
Since you that rules the wilds are dead.

Your vibrant tones are heard no more,
That pierced the night with far-flung cry.
On high the watchful vultures soar
And see subdued your flashing eye,
Your right to live let none deny,
As part of Nature wild and free,
But life is brief and all must die
Nor man knows not his destiny.

No foe to fear, no friend to praise
And none there are to heed,
But man, with all his evil ways
Your wild estate with selfish greed;
Now silent as shadows that fade,
When night covers over the day
In forest, mountain and glade,
Your kindred is passing away.

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

IN DECEMBER SKIES

By ISABEL M. LEWIS

AT NO time of year may so many brilliant stars be seen in the evening hours as during the winter months. As soon as Sirius and Procyon appear above the eastern horizon later in the evening there will be nine stars of first magnitude or brighter, and more than a score of the second magnitude in view. This winter, in addition, one may also see during the greater part of the night the rare phenomenon of the two greatest planets of the solar system, Jupiter and Saturn, close together in the constellation of Aries. They will be in conjunction again—for the third time in a period of approximately six months—in February. As Jupiter surpasses even Sirius, the brightest of all the stars, in brilliancy, and since Saturn is now about equal to Rigel or Capella in brightness, their presence and unusual position in the December evening sky greatly enhances its splendor.

In a recent article in *Popular Astronomy,* Dr. Peter van de Kamp of the Sproul Observatory of Swarthmore College, gives what is probably the best obtainable information at the present time regarding the distances, luminosities, and, in such instances as they are known, the diameters of the twenty-two brightest stars in the heavens. This list includes Castor, or Alpha Geminorum, which, with a magnitude of 1.6, is usually classed with the stars of second magnitude. Ten of the stars in this list may be seen in the evening sky in December, and it may be of interest to our readers to give from this source some of the facts that are known regarding these exceptionally brilliant suns. Some of them, as we know, appear unusually bright because they are so close to our own solar system, while others, fewer in number, are brilliant, although at great distance from the earth, because they are giant suns of great intrinsic luminosity.

The stars we are to consider are, in order of their apparent brightness, Sirius, brightest of all the stars, in Canis Major; Vega, in Lyra; Capella, in Auriga; Rigel in Orion;

Procyon, in Canis Minor; Betelgeuse, in Orion; Aldebaran, in Taurus; Pollux, in Gemini; Deneb, in Cygnus; Castor, in Gemini. The nearest to us of these stars are Sirius, at a distance of 8.6 light years, and Procyon at a distance of 11.1 light years. So accurately are the distances of these stars known that they are among the few whose distances can be given to tenths of a light year. There is a probable error of only a tenth of a light year in the estimate of their distances. Only one star, Alpha Centauri, in the list of the twenty-two brightest stars, distant 4.28 light years and nearest to us of them all, has a value for its distance more accurately determined. When one comes to the determination, by various methods, of the distances of stars thousands of light years and more from the earth, one may expect estimates of their distances to be subject to an uncertainty of as much as one-fifth of their values. Vega, at a distance of 27 light years, Pollux at 29, Capella at 42, Castor at 47, and Aldebaran at 53, are among our nearest neighbors in space. The estimates of their distances are very probably correct within less than one-tenth of the values given. When we come to the remaining three stars in our list we find distances much greater and estimates less reliable. Betelgeuse, in Orion, is at a distance of 300 light years, with an uncertainty in its distance of about 30. Deneb, at the top of the Northern Cross in Cygnus, is estimated to be at a distance of 400 light years, with a probable error in the determination of 50. The most distant of these stars, Rigel, or Beta Orionis, is at a distance of 540 light years with a probable error of 90.

All but four of these stars, namely, Vega, Betelgeuse, Pollux, and Deneb, are double or multiple stars. Their companion stars are in some cases visible in the telescope; in other instances they are known to be present only by the shift in the spectral lines of the visible star, in which case they are known as spectroscopic binary stars, as distinguished from the visual binary stars. Remarkable among these double or multiple star systems are Sirius, with its faint but excessively heavy white dwarf companion star, and Capella, the spectroscopic binary star that also reveals the presence of its companion star visually in the most powerful telescopes. This companion also has a faint attendant, so that Capella is the principal star in a triple star system. Castor is remarkable for the fact that it is at least a sextuple star! Each of its three chief components is in itself a spectroscopic binary star. Procyon is a visual binary star. Rigel is known to be a spectroscopic binary. The two stars of which it consists revolve around each other in a period of 22 days. Aldebaran has a faint companion that is separated from the bright star, about which it revolves, by a distance equal approximately to 5000 times that which separates the earth from the sun.

Betelgeuse is noted for the fact that it varies irregularly in brightness by more than a whole magnitude, or more than the difference in brightness of Vega and Aldebaran. Its light changes have a period of between five and six years.

In intrinsic, or inherent, brightness all of these ten stars are more luminous than our own sun. The three supergiants—Rigel, Deneb and Betelgeuse—are, respectively, 21,000, 4800 and 3600 times more brilliant than the sun. Capella is 150, Aldebaran 91, Vega 63, Castor 33 times more brilliant than the sun. The two companion stars of Castor are respectively 16 times and only five-hundredths as bright as the sun. Sirius, itself, is equal to thirty suns such as our own in brightness, but its faint dwarf companion has only one thousandth of the luminosity of the sun. Pollux is 25 times as bright as the sun, but Procyon, the least brilliant intrinsically of these ten stars, is only seven times as bright. Its faint companion has but five ten-thousandths the light-giving power of the sun.

When it is possible to measure the angular diameter of a star with the interferometer, the diameter in miles can also be found, provided its distance from the earth is also known. It has been found in this way that Betelgeuse has a diameter of about 370,000,000 miles, which is greater than the diameter found for Antares by nearly 100,000,000 miles. Antares was at one time believed to be the largest of all stars whose diameters had been measured, but more dependable measures of the distances have changed these estimates. Aldebaran, also a giant star, has a diameter estimated at one-third of an astronomical unit, or about 30,000,000 miles.

A swarm of meteors known as the Geminids, because its radiant lies in this constellation, has been found in recent years to give a display that averages greater than that of any other swarm with the exception of the Perseids. Unlike all the other principal meteoric showers the Geminids have their greatest activity before rather than after midnight. The average hourly number of Geminids visible to one observer is estimated to be about 30, as compared to 50 for the Perseids and 20 for the Leonids. Their maximum display is about December 12, but they may appear in less numbers over a period of 14 days. Full moon on December 14 will interfere with the observation of the Geminids at the most favorable time this year, but they may be seen at some time during the 14-day interval over which they are observable. Some members of this swarm attain considerable brilliancy. As their name indicates they will come from the general direction of Gemini; one will see them in the earlier hours of the evening as well as near midnight.

It is possible that Comet Cunningham, discovered early in September, may be visible faintly to the naked eye in the latter part of December in the western evening sky, but this is uncertain as the comet is not brightening as rapidly as was at first anticipated.

Winter will begin on December 21 at 6:55 P.M., Eastern Time, when the sun will have its greatest southern declination. This will be the shortest day of the year in the northern hemisphere.

Jupiter and Saturn, as we have said, are still an exceptional attraction in the evening sky in Aries. These are the only two planets now visible in the evening. Venus and Mars are both conspicuous in the morning sky before sunrise and will be in conjunction on December 2. Mercury may be visible in the morning sky for the first few days of the month but will be too close to the sun to be seen during the remainder of the month.

CAMERA TRAILS

(Continued from page 555)

ly recommend to the beginner. It had to be foolproof, simple to operate, light, and inexpensive and yet able to make good pictures, and it took me a long time to find it. Recently I have suggested the Agfa Speedex to several students and they are more than pleased with it. It uses the popular 120 film and makes 12 pictures, 2¼" square, on a roll. Your dealer has it.

It is the middle of October as I write this, and it seems early to try to say it, but I appreciate the interest you have shown in the contest and in Camera Trails during the year and I want to wish every one of you the very merriest Christmas you can imagine. Save this page and look at it again on Christmas morning. "Merry Christmas"—and I'll save the "Happy New Year" until next month.

Camera Trails is your department and I want it to be as valuable to you as possible. To that end I will appreciate your criticisms and suggestions and will try to answer any of the photographic questions you may care to ask me. Address your letters to Norris W. Harkness, NATURE MAGAZINE, 1214 Sixteenth Street, N. W., Washington, D. C.

The Contest

With more than a hundred entries in this last month of the Camera Trails Contest, the chief task of the judges was to decide on the relative merits of pictorial value versus Nature interest. The standard of the entries has been much higher than they expected all through the contest, but especially so in November and December, and this, coupled with the great variety of subject material and the real Nature worth of so large a proportion of the prints, made the decision difficult. It is their feeling that any of five or six of them might have received the awards, but on careful deliberation the winners are Dr. J. S. McKenzie of Miami, Florida, for his "Expectant Mother"—a shot of a Noddy Tern—and R. E. Hart, of Clearwater, Florida, for his picture of a young fox.

Both of these pictures are excellent in quality and show the results of careful stalking and planning. Dr. McKenzie used a Recomar-18 with an exposure of 1/50th second at f/5.6 on Super XX. The data for Mr. Hart's shot are not available but will be given later.

The runners-up are George A. Smith of Quarryville, Pennsylvania, F. Kirkbride of Los Angeles, California, and Hugh M. Halliday of Toronto. All five photographers are entitled to sincere congratulations for winning in such competition.

Since this is the last of the monthly contests, there remains to be announced only the name of the winner of the grand prize. The judges have not yet decided on his name, but we will begin the new year with that announcement.

As has been said before, there are many entries of value and quality that could not receive prizes but that deserve to be shown to as large an audience as possible. So it is the plan to illustrate these pages in the months ahead with some of the honorable mentions and other prints that will be of the greatest help and interest. Maybe yours will be one of them.

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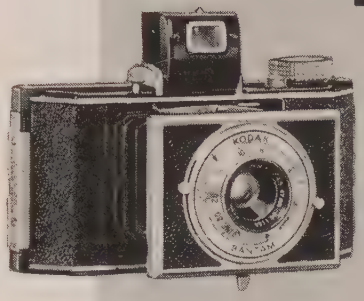

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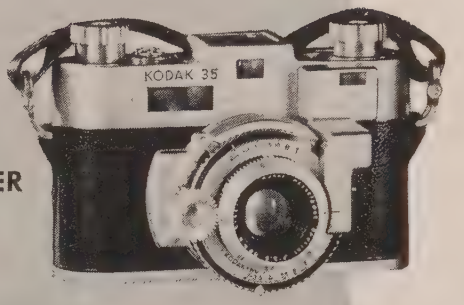

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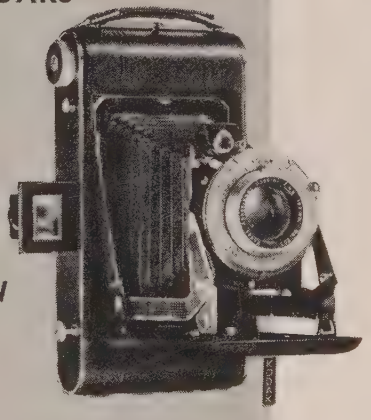

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THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

Furs in School

The average elementary teacher, if asked to teach a lesson on furs, would probably start with the everlasting Eskimos. She would tell all about what a hard time she *thinks* they have getting along in the remote places in the North. If she was trained in one of the modern fusion courses in social science, she would probably start with the role of furs in winning the great Northwest for the United States, or tell of the importance of furs in the days of barter. This latter might provide useful training for what we may have to do in the future, but it is doubtful if any of this sort of stuff is what the child in the elementary or secondary school would want. Certainly it would make the practical trapper, or the so-called sportsman-conservationist, laugh loudly and long.

Why can we not do something to bring the school teacher to face facts as they are locally and not to think that the only possible source of inspiration is some dry academic schoolbook? With marshes, fields and forests harboring certain kinds of fur-bearers even in these modern times, consideration of these animals rarely gets into school programs. Even less rarely are they considered in forestry texts. If the average conservation department considers them at all it is largely in their role as predators. Some people blame the skunk for the diminution of various forms of wildlife, but somehow we cannot forget that our game birds and the skunks managed to get along more or less harmoniously long before the white man came in to manage affairs. Still, we think we must have some animals to blame, so the fur-bearers get their share.

One of our largest eastern cities, supposed to be an educational model, has an elaborate science outline without any practical consideration of fur-bearers. Yet W. G. Vinal reports having found mink tracks in winter in a park in the heart of a populous city.

Of course the introduction of the trapping idea brings up the problem of humaneness and what traps can or cannot be used, and when and where they may be set. The insert in the center of this issue of NATURE MAGAZINE publishes the statement that in New York it is illegal to use a box trap for trapping certain fur-bearers. When that article was written and set to type, this law existed. Shortly after, it was changed, due in part, possibly, to the appearance of a statement published elsewhere by the writer. Why is it not good in the schools to study the justice and sense back of laws? They are presumably made by the people and for the people. That New York law, which forbade the use of box traps in taking muskrats, made it impossible for the trapper to free unharmed females that were bearing young, since the season did not open until after the breeding season was under way. The result was that the muskrats had to be taken in steel traps, and if freed must face life under a handicap. Obviously this sort of procedure was not intelligent wildlife management. In New York, this part of the law at least has been corrected to the extent that one can be legally sensible if he wishes to, but he is certainly not compelled to be sensible in the matter. One step in the right direction has been taken. When will the next one be taken?

Furs also open a splendid opportunity for practical economics with the school boy who may do a little humane trapping on his own outside school. With the price of northern muskrats running from $1.25 to $1.50 and of southern muskrats from 50 to 70 cents, some real geography problems appear. But if the boy or his mother goes into a hat store and asks the price of a hat with less than half a muskrat pelt on it, he is told that the fur raises the price of a four-dollar hat to nineteen dollars. The writer had this experience during the current week. How can a pelt, which at its best cost no more than two dollars, be divided in two and still raise the price of a hat fifteen dollars? There is a mystery somewhere that might be worth investigating.

And then this story of trade names as applied to furs carries with it real dynamite. Advertisements must carry the names of furs used in coats, but these same names are not in the zoology texts. Brook Mink, Bisam Mink, Desman, Golden Rat, Hudson Seal, Hudsonia, Jersey Rat, Muskrat, River Mink, Russian Otter, Silver Muskrat, Water Mink —all are names that in commerce are properly or improperly applied to the muskrat. Surely a coat bearing the reputation of being made of Hudson Seal should bring a higher price than one made of Rat. The trade names applied to rabbit are almost as numerous as the offspring of this prolific animal. (See NATURE MAGAZINE, December, 1931, p. 375.) Let the children get the trade names of the furs offered for sale locally, and then, from the references given on page 588 of this issue, or possibly from the charts, learn what animals really produced them.

The story of the growth of the fur-farming idea is always interesting. In recent years, its growth has been so great that there is reason to expect that eventually the furs needed for commerce may be produced in captivity and the animals producing them may be killed as humanely as are the animals producing the meat of the butcher shop. Since it seems well nigh impossible to get furs out of style, it is devoutly hoped that fur-farming may prosper.

Fur-farming has been made possible largely by solving problems centering around the food of fur-bearers. The food must be economical. It must produce animals whose pelts are the equal of the best produced by the wild species. It must be known what are the needs of the young, of the nursing and pregnant mothers and of the animals at other stages. Only recently a bulletin, *Nutrition of Fur Animals* by Charles E. Kellogg, has been published as Separate 1717 of the 1939 Yearbook of the United States Department of Agriculture. It should be a part of every high school science library and might well be used in connection with lessons on nutrition in high school biology. In addition, of course, it might save much trouble for those who are engaged in fur farming on any scale. It is infinitely more practical as conservation material for school use than the commonplace moanings about how the good old days are gone beyond recall, and the world is going to the dogs.

If the high school science teacher is a microscope addict, furs will offer a promising outlet for energy. One wishing to follow this as a hobby will find an article by Dr. Leon Hausman, published in NATURE MAGAZINE for November, 1939, helpful. Dr. Hausman was a pioneer in this field. Also, Dr. Julian D. Corrington, editor of NATURE MAGAZINE'S microscope department, will be glad to aid in solving problems of microscopic study.

Boys who can roam the open places may like to get the habit of collecting hairs from burrow entrances and trying to identify them by using a microscope. A collection of such hairs could never be so bulky as a stamp, butterfly or stone collection, and might be even more interesting and exciting if each hair had notes concerning where and when it was collected and an estimate of what it was determined to be. This same hobby might be extended to include hairs collected in zoos, at circuses, in museums, and, incidentally, from garments in fur stores. There might be some danger in surreptitiously collecting the hairs in the zoos, museums and fur stores, but diplomacy might help.

The publications of the Anti-Steel-Trap League of Washington, D. C., should be sought by anyone trying to build up a library on matters dealing with fur-bearers. Through them may be found information on the controversy over the use of poisons by Federal agencies. This problem has also been considered frequently in the pages of NATURE MAGAZINE, and will probably continue to be annoying for a long while. To help in understanding it, school children might well make circles showing the food chains in which the fur bearers play a part. These should present a picture of the competition for vegetation between domestic animals and mice and ground squirrels. They should be credited for services as rodent catchers, since they and the birds of prey are the most effective mouse traps in Nature. Then the problem of balancing this service against the injury that the fur-bearers inflict on domestic species calls for the best of judgment. Effective notebooks, posters and cartoons may result from a study of this sort if the teacher favors these methods of expression and recording. Further enriching material may be had from the fur publications of the Fish and Wildlife Service in Washington.

What effect the war may have on fur raising and fur marketing remains to be seen. It is reasonable to assume that furs are essentially luxuries, that they will be purchased most freely and at best prices when unemployment is low and income high. If this assumption is correct, it would seem that immediate future demand is not likely to increase. Taxes are bound to be high and reserve wealth low. What may happen next may possibly be guessed as accurately by a high school boy or girl as by the most erudite economist. It is fun making a guess, and in this case the answer will probably not be long in coming.

NATURE IN PRINT

As a convenience to readers the books reviewed in the pages of Nature Magazine may be ordered through the book department of the American Nature Association, 1214 16th St., Washington, D. C.

(Continued from page 559)

and observations. Her book *Wings at My Window* is a fitting culmination, for the present, of all that she has done. Its style, as Richard W. Westwood says in a foreword, is "sincere, distinctive, and infectiously enthusiastic," and in addition to its accounts of feeding and banding birds it tells "a vital human story—a story of suffering; of struggle; of hope renewed through friendship with birds." *Wings at My Window* is certainly an interesting, inspiring, and informative book, and it should have an enduring place both in the literature of birds and the literature of courage.

It is not likely, however, that any accomplishment of Mrs. Govan's writings will ever seem as precious in her eyes as their effectiveness in bringing about what she calls "the miracle of the sanctuary," the preservation from sub-division of a ten-acre tract of woodland adjacent to her home and essential as habitat for the birds who visited her feeding and banding stations. This "miracle" was indeed a climax of triumph following a recurrence of despair that came over her when she first heard the sound of the woodcutter's axe. With a desperate hope she told the story of her sanctuary in the July, 1937, issue of NATURE MAGAZINE, and the result is certainly a reassurance to all who are concerned for the preservation of green places. "During the next few months more than eight thousand dollars came in from all over the country from people who loved birds," and Mrs. Govan became the lifetime guardian of the Woodland Bird Sanctuary.

Faith in the tonic and healing influence of an association with birds has been frequently expressed in recent years by an increasing number of advocates of wildlife conservation. Mrs. Govan has put this faith to test, and good works have proved it true. It is not surprising that she holds her hours with the birds "among the most precious things in life," and they are seen to be of almost supreme value when she says, "I count as even more precious the stamp that these hours have set on the life of my son." Her discussion of relations between parents and children in a chapter on "Children into Bird Lovers" gives an unexpected richness to her book, *Wings at My Window,* and suggests an added recompense for the love of birds, a love that has never yet been unrequited.

In some European countries a sheaf of grain is raised on a pole at Christmas time as a holiday symbol of man's interest in the birds. A copy of *Wings at My Window* under the Christmas tree should serve the same purpose, a book to be enjoyed most when peace, good will, a happy family, and a child seem most precious, a book that will surely lead many of us to protect and enjoy the beauty of birds so intimately throughout the year that, as Wordsworth said,

—the fretful stir
Unprofitable, and the fever of the world,
Rash judgments, nor the sneers of selfish men,
Nor greetings where no kindness is, nor all
The dreary intercourse of daily life,
Shall e'er prevail against us, or disturb
Our cheerful faith, that all which we behold
Is full of blessings.

If by December 25 there are any bird lovers who have not yet read *Wings at My Window,* there are some people who should have a rather simple Christmas book problem this year.

Pacific Flora

From Stanford University Press comes a second printing of Volume One of *Illustrated Flora of the Pacific States* by Leroy Abrams, Professor of Botany at Stanford University, and the assurance that Volume Two of this monumental four-volume work will appear in December. Volume One made its first appearance in 1923, and a new edition has been brought out because the paper stock used in the earlier printing proved so brittle as to be unsatisfactory for frequent handling such as is given to a valuable reference work like this. Incidentally, the publishers offer owners of the first edition a credit of three dollars on the old copies in purchasing the new edition at $7.50.

Volume One covers Ferns to Birthworts, each one of the species illustrated by line drawings, as will be the case throughout the entire group of volumes. In the new edition a few minor corrections have been made. Dr. Abrams' work is, of course, a significant contribution of inestimable value to anyone interested in the study of western wild plants. It represents forty years of study of the flora of western North America, and preparation of the material for these volumes was started twenty-five years ago. Volume Two will cover 1655 species in the families from Buckwheats to Kramerias. Volumes Three and Four are in preparation but no publication date has been set.

In Australian Waters

In the first volume of a projected series on *The Fishes of Australia* Gilbert Percy Whitley, ichthyologist of the Australian Museum at Sydney, covers the sharks, rays, devil-fish and other primitive fishes of Australia and New Zealand. Published by the Royal Zoological Society of New South Wales, this book pictures and describes in both popular and scientific terms, the habits, form and lore of these interesting fish groups. There are more than three hundred photographs, drawings, maps and diagrams. The book is quoted at seven shillings, six pence, and is available from the Society, Box 2399MM., G. P. O., Sydney, Australia.

Chinese Wildlife

In his latest book—*China's Animal Frontier*—Clifford H. Pope tells an informal and entertaining story of his experiences collecting in China as a member of the Roy Chapman Andrews Third Asiatic Expedition. He spent a year and one half with the

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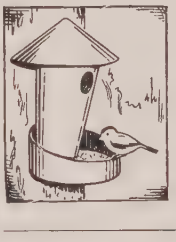

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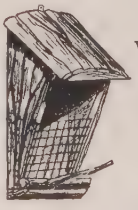

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Chinese. The first part of his book, in which he tells of learning the language, is entertaining; his experiences learning to get along with the people and to like their food are enlightening; his collecting work at moments exciting. The publishers, the Viking Press, describe the book as for young naturalist and would-be explorers. We think that this is limiting its distribution, for it has a wider appeal. The price is $2.50.

A Dog Talks Back

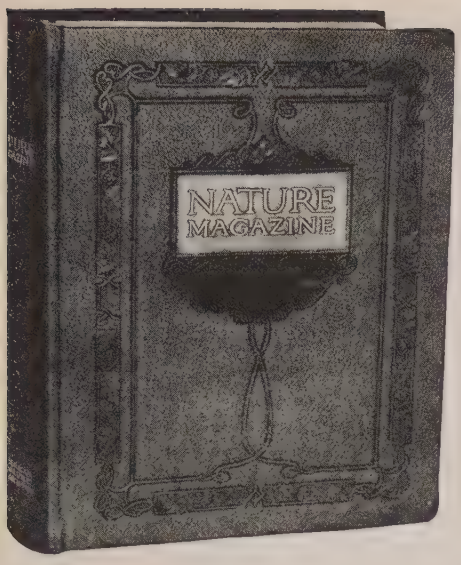
"For years dog owners have been writing books and magazine articles on how to train us. As if we dogs are the ones who need training! Nine times out of ten the shoe is on the other paw." So says Sniejok, the Samoyede, to William and Neill Dingledine, who are the recorders and photographers of his book, *How to Train Your Owner*. Sniejok —which is Russian for snowball—presents his case in seventy-one remarkable photographs with accompanying brief text. He divides his discussion of the owner problem into eleven chapters, dealing with the choosing of an owner, making the owner feel at home, sleeping, eating, reading, getting your owner up, exercise, getting in and out of trouble, bathing, weighing and travel. The photographs are graphic and in none of them is the face of a human seen. It's a dog story, and one that any dog lover would revel in. The book is published by Macmillan, and sells for $1.75.

FLOWERS THAT DEFY JACK FROST

(Continued from page 598)

to establish. A nook in between two rocks, or where it can peek out from a partial shelter of low-growing evergreens, will suit it well, provided the ground is kept on the acid side with peat moss or leaf mold. It is easily propagated by layering low-growing branches, or by cuttings in sand. Like the other winter-bloomers, it varies considerably in season of flower, but this only adds a bit of the surprise element. I have had it bloom in almost every month from December to March and it has always been welcome. In the colder sections of the country winter heather will relish some protection, but in my Connecticut garden it does well with just the normal covering of snow, although it suffered badly in the winter of 1939-1940, as did all the other heathers.

Winter aconite, *Eranthis hyemalis*, is a tricky little bulbous plant that sends up yellow flowers in late winter or early spring, about the time the first snowdrops show their heads. The flower resembles a buttercup with a greenish ruff beneath it. After the flower has faded, the leaves, which are palmately cut, linger on until seed is formed, and then they too disappear, not to show up again for another year. The plant is not fussy as to soil or location, except that it likes partial sun and good drainage. It will grow with other plants that do not make a dense covering, such as a thin stand of periwinkle or myrtle, or a low-growing thyme or sedum. The important consideration is to have *fresh bulbs* and to get them into the soil *at once*. Set them in July or August, if possible, and if there is any doubt about their freshness, *do not buy them*. Once established in a spot that is congenial, the plants will thrive and even multiply from seed. I have seen this



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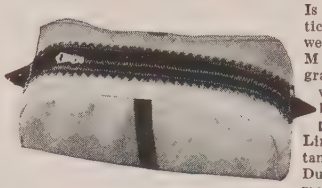
in the garden of Louise Beebe Wilder, but have never been so fortunate in my own garden. The bulbs are ordinarily not expensive, and even if they only last a season or two are well worth having for they come at a time when any show of color in the garden is appreciated, and especially a golden yellow, for crocuses do not usually appear until a little later. There are a number of different sorts, but only the one mentioned here is available from the usual sources.

Now we come to a flowering plant that seems to me to be about the acme of desirability for winter bloom. It is not hardy too far north, unless protected, but it does well from Philadelphia to southern Connecticut, and if you can grow it, by all means do not delay another season in getting it started. This golden gem of the colder months is none other than winter jasmine, *Jasminum nudiflorum*. It is a trailing shrub with green stems, almost evergreen leaves, and the flowers are as cheery a yellow as forsythia. Because of its habit of not opening all its buds at once, its season is longer. I have known it to bloom in February, and it makes a brave show in March before forsythia opens up. The secret of making it thrive seems to be in the choice of a location. My brother-in-law has it growing against the south side of his house in Riverside, Connecticut, and it is so trained against the wall that it resembles a clinging vine. The buds form in early fall and open almost any time after January first if the weather stays warm for a few days at a time. The plants are available from quite a few sources, are reasonable in cost, and once established it can readily be propagated by layering the trailing branches.

Another early bloomer that can hardly be rated as frostproof, but that belongs in every good garden collection, is February daphne, *Daphne mezereum*. It is a small upright shrub that resembles nothing so much as a miniature lilac in both habit and in flower, except that it is even more floriferous. While it cannot be said to be so dainty as its fragrant cousin, *Daphne cneorum*, or garland flower, it is much earlier, and the reddish-purple flowers are intensely fragrant. Coming well ahead of the leaves, it is an extremely welcome visitor in March, or whenever it chooses to make its bow. It does not seem to be fussy as to soil, although preferring to be on the alkaline side and to keep its feet dry.

Before we leave that indefinite and cheerless period between winter and spring, we must include one more plant in our brief list of frost-defiant plants. It bears the formidable name of *Rhododendron mucronulata* (sometimes *Azalea mucronulata* in the plant catalogs), and since nobody has bothered to find a suitable common name perhaps this explains its rarity, although it is now fairly common in the grounds of discriminating gardeners. It grows rather tall and is really more like a small-flowered rhododendron, but much daintier. In my side yard there are two, both about eight years old, from the Bureau of Plant Industry. When the first daffodils have opened but before the forsythia is wide awake, I suddenly remember to look at these early species. Sure enough they will be in bloom, or one of them at least. They do not bloom together although planted hardly ten feet apart in exactly the same soil. The petals are a delicate shade of lavender, something like a peach blossom, but much larger, and if I knew I could never replace them I would not sell them for their weight in silver—no, not even gold!

Bean's Leather Toilet Case



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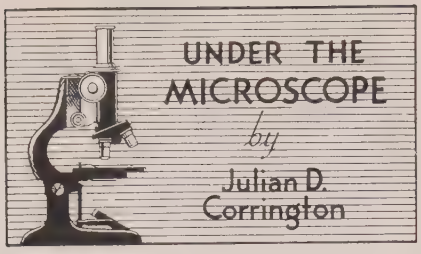


Microprojection

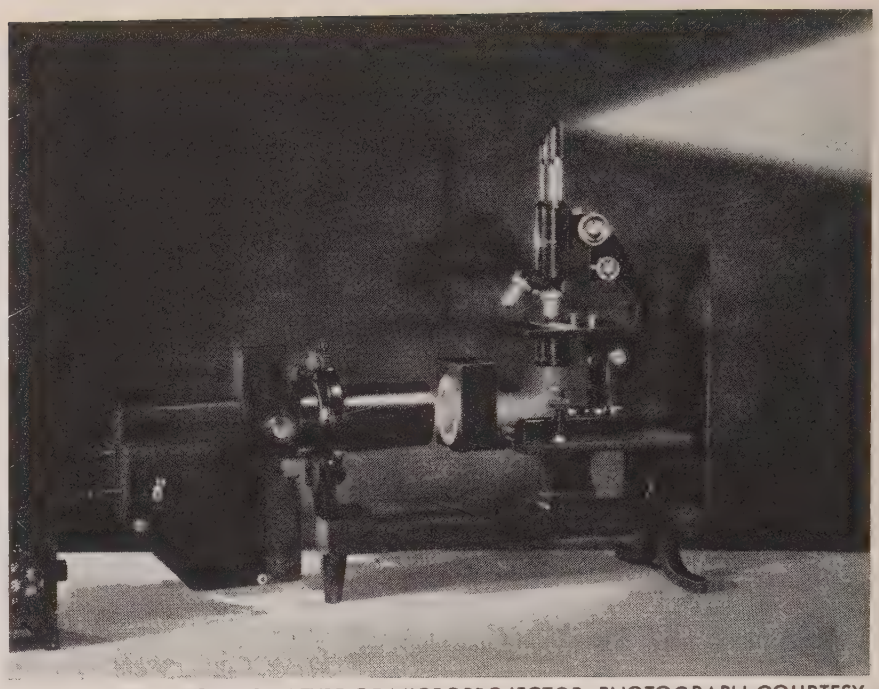
Unquestionably the most fascinating of all special uses for the microscope is photomicrography, and after that microprojection—the two being very closely allied. In fact, in our account of the first of these in the January, 1938, issue, we stated that photomicrography was but a form of projection with the microscope. The magic lantern was, indeed, one of the earlier kinds of microscope and all projection devices today, including the motion picture projector, are actually microscopes since they provide greatly enlarged images of small objects.

Microprojectors differ from ordinary lantern slide or film projectors only in the size and focal length of the lenses employed and in the type of material projected. Microscope slide attachments for low power magnification are available for all of the standard models of projection machines, such as are commonly found in schools. We will deal here, however, only with those instruments designed especially for the projection of microscopic objects on slides.

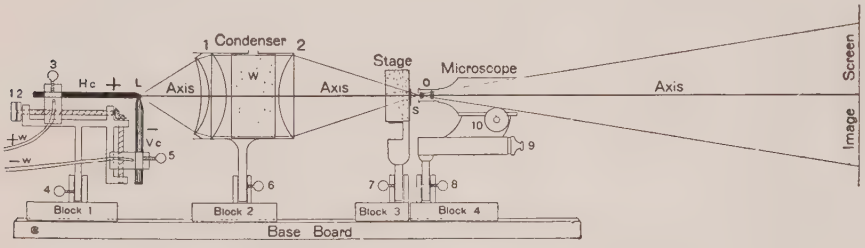
Microprojection has enormous advantages over visual observation through the microscope in certain cases, notably for classroom instruction, club meetings, public exhibitions or private entertainment, where it is desirable that a number of people see the same subjects simultaneously. The teacher or demonstrator may show the material and discuss it, readily pointing out essentials and making certain that everyone sees the things he should and that all see the same things. Opportunity is provided for discussion on the spot, there is immense saving in duplication of costly equipment, and the one-in-a-hundred perfect slide may be shown to all members of the group. Drawing and measurement with the microscope are also greatly facilitated by the projection method, as we shall describe in a later issue.

On the other hand, too much must not be expected or disappointment is certain. High power projection is difficult and requires experience, much tinkering, and expensive equipment. Details on the screen are never as clear as by the visual method; not all objects will project satisfactorily; and the room must be dark.

The problems of projection are mainly those of lighting and alignment. A point source of light is ideal, and the nearer we can approximate such an illuminant in practice, the better the results. Nothing is superior to the carbon arc, and the more expensive forms of commercial projectors are so equipped. For the average person, though, a more compact and cheaper unit would be one of the newer forms of small, concentrated-filament bulbs, such as the 6-volt auto headlight or spotlight bulbs. The light is intense and from a very small area. A transformer is required in order to run such a light from the house current.



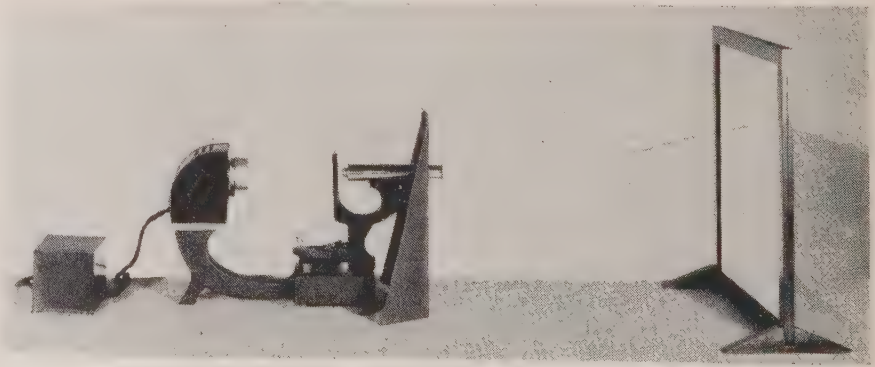
A STANDARD LABORATORY TYPE OF MICROPROJECTOR. PHOTOGRAPH COURTESY OF THE BAUSCH AND LOMB OPTICAL COMPANY



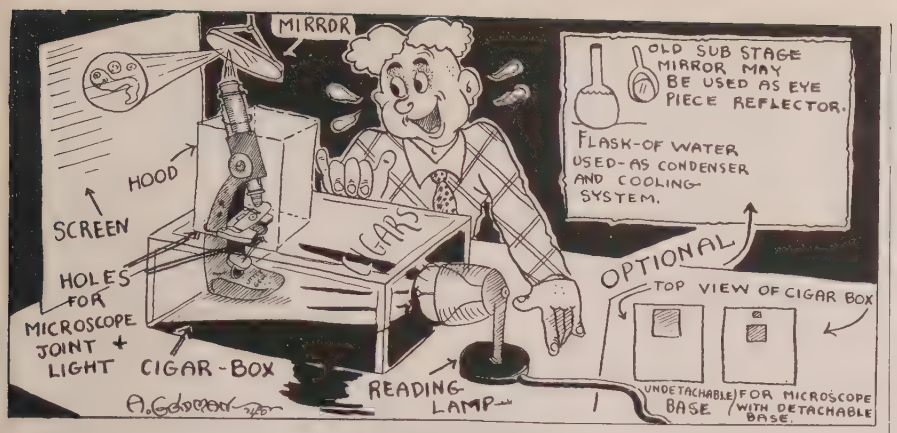
PROJECTION MICROSCOPE. L—LIGHT SOURCE; S—SLIDE; W—WATER CELL. FROM *OPTIC PROJECTION*—BY GAGE AND GAGE

Next comes the designing of a suitable condensing system, which will take the diverging rays of light from such a lamp and render them first parallel and then converging, as per an accompanying diagram. Suitable lenses may be secured from opticians, or one may use whatever may be on hand, such as reading glasses or hand magnifiers, or discarded flashlight lenses. The dioptric spectacle lenses used in examining eyes are excellent and not expensive. One of our correspondents, O. H. Lovejoy, who presides over biology at Paseo High School, Kansas City, Missouri, made a condensing assembly by removing the legs from a tripod magnifier, containing two biconvex lenses, and two cheap magnifiers of the reading glass type from the dime store. The handles were sawed from these and the frames affixed to the top of the tripod magnifier with Duco cement, thus making an almost solid battery of four biconvex lenses. By trial and error it was discovered that this combination would do the trick and deliver a cool beam of light, properly concentrated.

This business of a cool beam is important, as heat will ruin many sorts of slides or cook living material, and is generally attended to by insertion of a water cell between components of the condensing system. Such a cell may be purchased or made from strips of glass salvaged from broken window panes. The size doesn't matter particularly, but 3″ wide by 3″ to 4″ high and 1″ in depth (fore and aft axis, through which the light rays pass) may be suggested as suitable. This rectangular glass box is assembled with Duco or other cement and tape, and the top is left open for renewal of the water, which cuts off the infra-red rays from the illuminant and thus absorbs most of the heat. Any small



INEXPENSIVE OUTFIT TO USE WITH A MINIATURE MICROSCOPE. PHOTOGRAPH COURTESY OF THE BAUSCH AND LOMB OPTICAL COMPANY



IN LIGHTER VEIN

glass container with two sides flat and parallel will serve.

Some technicians prefer to mount a plano-convex lens on each side of this water cell, the two convex surfaces facing each other, as per the diagram. Others add a meniscus (concavo-convex) lens ahead of the rest. You will have to experiment with what you have or can obtain in order to get a converging beam of light, focused to a point some 6 to 10 inches beyond the condenser, and to make observations of what is happening, do the work at night in a dark room, blowing smoke into the pathway of the light rays to make them sharply visible.

Most projection is done with the microscope in horizontal position, the substage mirror removed or turned aside. Locate the instrument at such a distance from the condenser that the beam of light exactly enters the microscope objective, completely filling the front lens, but no more than filling it; the aim being to try to get all of the light delivered by the condenser into the objective. For the usual low power images, do not use a substage condenser (if one is present on your microscope) or the ocular.

Alignment in commercial models is effected by mounting all parts on an optical bed—a metal track on which the separate components slide back and forth. One can vary distances apart, but cannot displace in any other plane, hence an optical axis once secured is readily maintained. Those with any aptitude for wood or metal working will not find it difficult to construct an optical bed if they desire this type of projection equipment—a perfectly straight and horizontal track or groove on a heavy baseboard, and several carriers for the various components that will slide along the bed and can be clamped tightly when in correct position. Start with the lamp housing in place, then slide the condenser assembly along and adjust so that light rays conform to the diagram we give, then similarly adjust the microscope.

As a screen, nothing can equal a plain white plaster wall, frequently available in some room of the home or school laboratory. A white bed sheet or plain tablecloth, a white window roller shade, and a large piece of dull white (not glossy) cardboard are other choices, in addition to commercial screens. Projection distances may vary according to the material used and the number of persons assembled, but keep in mind that illumination decreases as the square of the distance increases, the amount of light remaining constant but having to be spread out over an ever larger area as the screen recedes from the objective. A bright image of smaller size is greatly to be preferred over a larger, dimmer one.

That type of lens made for low-magnification photomicrography without a microscope—a form of work known as macrography—is best for projection and designated by various trade names, as micro tessar (B & L), micro-teleplat (Spencer), argus (Watson), microstigmar (Beck), microsummar (Leitz) or microplanar (Zeiss). They may be screwed directly on the front of a camera or on the microscope nosepiece, sometimes with the necessity of using an adapter. For the next increase in magnification come regular microscope objectives of 48 and 32 mm., which may be bought as separate items and are not particularly costly. Removing the front combination of the usual low power, 16 mm. objective, provides one of these lower power lenses. Finally, unless one wishes to go in for carbon arc illumination, special condensers and other equipment, projection had best be limited in the upper range of magnification to the 16 mm. objective in its complete form, its initial power being 10X.

If the light is strong enough, the 5X ocular may be used. Special low power eyepieces for projection are available at little cost. Where an increase in magnification is wanted, the rule is to use as low an objective as possible and obtain the increase by means of an ocular or amplifier, since this will provide a larger field and more light than if a stronger objective is employed. The amplifier is a plano-concave lens that will cause divergence in the rays going to the screen and hence spread the image over a larger area. It should be housed in a tube that can be slipped into the microscope in place of the ocular, hence an old eyepiece casing is especially indicated.

As subjects, begin with large, well mounted and clearly stained sections, as plant stem, earthworm, or vertebrate organ, or whole mounts such as parasitic worm, mosquito, louse or flea. Avoid protozoa and objects of similar minuteness at first, and do not try bacteria at all. Later, after your setup works well, and you have stored up some experience, try the microscope in vertical position, using the substage mirror to direct light rays up the tube, and with a second mirror or a 45° prism placed at the eyepoint, above the ocular, to change the direction of the rays back to the horizontal again, as is seen in our photograph of a professional outfit using a standard laboratory microscope.

The vertical position maintains the stage flat so that fluids may be projected, providing opportunity for a natural form of "moving pictures" when living protozoa appear on the screen. Try large species, as paramecium or stentor, and some of the higher

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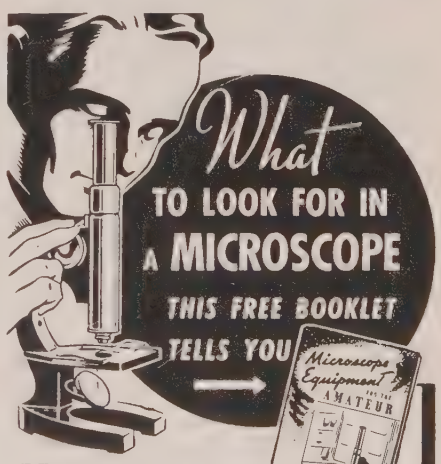

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animals as well, as hydra, small worms, rotifers, mites and microcrustacea. Watch the heart beat in a living daphnia, see circulation of the blood in the web of the frog's foot, and marvel at the beauties of crystallization, when salts form from saturated solutions while you watch. One of the most beautiful objects for projection is a permanent slide of a fatty acid, warmed until melted, placed on a flat stage, and observed while cooling with polaroids in place on the microscope and the discs crossed to yield polarized light. The weird shapes and magnificent colors of the crystals that form and grow will far more than repay the small effort attending the setup.

Somewhat less efficient than the optical bed arrangement, but much more compact and easily built, is the box type of projection assembly. We have seen a unit made from a chalk box that worked very well, and another made from sheet metal about the size and dimensions of a shoe box. Sheet rock lends itself well to this work. The lamp is secured in the box with a trouble socket, and sheet asbestos is used as may be required to prevent excessive heating. The condenser lenses may be soldered in place in the box lid, between lamp and microscope, which is placed directly above, on top of the box, in the vertical position. Rays from the lamp shoot up through the condensing lenses into the microscope, which is secured to the lid by leather or metal sleeves or shoes, to permit accurate alignment.

Our cartoon illustration shows a simple apparatus built by Martin Rosenblatt, A.S.A.M. member from San Francisco, who employed one of the new style bullseye bedside reading lamps as his illuminant, and shot the practically parallel rays through an opening in a cigar box to the microscope mirror. The glass front of this lamp acts as one unit of a condenser, and though the outfit is not perfect, it works well and will project microörganisms in pond water a short distance.

In the various illustrations light screens or shades will be noted. These are necessary in order to keep outside or stray light from reaching the projection screen, and are easily devised as needs require. The only light reaching the screen should come through the microscope.

What of That Stocking?

Stocking? What stocking?—Well, Microfans, if you aren't aware of the season, just look at the month of this issue on the cover. Yuletide approaches, and Yule be wanting (excuse it, please) to slip in a not-too-subtle hint to other members of the family about that microgadget or that book over which your cardiac muscle has yearned these many months.

Or, gentle reader, you may have a microfan for a friend, and will welcome appropriate suggestions. Here are a few ideas to suit various purses and freight the Christmas stocking with joy.

High price range.

A medical microscope for the young man or woman who is going to enter medical school within the next several years; $155 to $255.

A junior binocular microscope for that serious worker of any age who already has an ordinary compound instrument; $107 to $138.

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A standard laboratory model microscope for that younger microscopist who has outgrown his miniature model, averaging $75.

Medium price range.

An oil immersion objective to attach to any standard model or make of microscope, $35.

A stage micrometer plus a micrometer eyepiece disc, for measuring objects accurately, $10.

A hæmacytometer, needed by all medical students and many others, for making blood counts, $10 to $18.

An Abbe substage condenser for the microscope not so equipped, $12 to $15.

An attachable mechanical stage, $25 to $50.

A polaroid disc polarizer and cap analyzer, professional grade, $19.

An amateur microscope, miniature but with excellent optics and guaranteed by manufacturers of national reputation. These instruments are not cheap toys; $14.50 to $21.

Low price range.

Lee, *The Microtomist's Vade Mecum,* standard encyclopædia of microtechnique; Blakiston, $9.

Box type, dissecting microscope, $3.

Gage, *The Microscope,* best known American work on the subject; Comstock, $4.

Binocular dissecting spectacles, leaving both hands free, 3X, $6.

Corrington, *Adventures With the Microscope,* basic work for applications of the microscope in all fields; Bausch & Lomb, $5.

Hand lens, essential in both field and laboratory, $2.25 to $7.50.

Allen, *The Microscope,* excellent new work on the instrument and its optics; D. Van Nostrand, $3.

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Trade Notes

A new edition is now on the market of Frobisher's *Fundamentals of Bacteriology* and we can recommend it most highly as a complete and fascinating account. The large amount of material is organized into three sections; fundamental principles, the species of bacteria, and industrial and medical aspects of bacteriology. There is a historical survey, details of staining techniques and culturing, the life and environments of microörganisms, immunology, chapters on viruses and pathogenic protozoa and many more subjects—a thorough-going job of organizing and presenting this science in attractive and understandable form. Pp. xvii, 653; 326 illustrations. W. B. Saunders Co., West Washington Square, Philadelphia. $4.

Bausch & Lomb have recently revised their famous H line of laboratory microscopes, retaining all of the older successful features and incorporating new designs and improvements. Their newest catalog, "Laboratory Microscopes Types A—B—C", has just been released and presents full accounts of these fine instruments, beautifully illustrated. Prices range from $83 to $293 with various stands adapted for school, medical, hospital, industrial and research usages. Send a 3c stamp to Dr. Julian D. Corrington, Nature Magazine, 1214 Sixteenth St. N. W., Washington, D. C. for your copy of this catalog.

One of our larger biological supply houses has issued three booklets of drawings of the anatomy of type forms widely studied in biological laboratories. *The Anatomy of Necturus—of the Bull Frog—of the Cat* consist respectively of 27, 33 and 34 admirably executed labeled figures by Richard R. Stuart. A splendid aid for teachers, independent workers, and students. A complete index for each booklet is a novel and welcome feature. Denoyer-Geppert Co., 5235 Ravenswood Ave., Chicago; 50c each; 55c postpaid.

This Living World is the title of a new and most attractive book by Clark and Hall of New York University. It is the first of a two volume set for a college course in science, *This Physical World,* the second volume, being scheduled for appearance in January. The present book of 519 pages is beautifully illustrated in the most approved modern style and makes enjoyable reading, pitched at the college level for persons who wish some understanding of man and his environment, yet do not wish to specialize in the science field. There are splendidly written chapters on the history of natural philosophy, geology and paleontology, the physics and chemistry of living beings, the structure and functions of organisms, with emphasis on man, the warfare of mankind against disease, and his social evolution through the ages. In short, we like this book very much and highly recommend it to all teachers of biology and to all persons who want a cultural background book in this field. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, $3.25.

A.S.A.M. Notes

Two more Chapters of our Society make their bow with this issue; the Huygenian Chapter of Boston and environs, and the Rafinesque Chapter, located at Transylvania College, Lexington, Kentucky. David L. Joftes, 652 Harvard St., Mattapan, Mass., is President of the first group, while Ralph C. Sisson, 1426 Commonwealth Ave., Brighton, is Secretary. All microscopists in the Boston vicinity are invited to affiliate. At Lexington the chief organizer has been Zygmunt S. Gierlach, with the sponsorship of Miss Aubrey S. Bradshaw of the Department of Biology.

Many other new Chapters are in process of formation, and we also have interesting reports from some of the older ones. A postcard sent by Wilfred R. Settle, Edmonton, Alberta, while en route to Toronto, states that he is now attached to the Royal Canadian Air Force and has turned over management of the Zeta Chapter to Philip Owen. Our best wishes go with Mr. Settle; may he have an early return to his laboratory.

"PLACE OF SORROW"

(Continued from page 567)

generally with that of their supporting object. They take on a rigid cast and show no signs of life throughout the entire period of their sleep. Unlike the double and triple-brooded related species of neotropical Florida, our butterflies remained in the chrysalis stage either one or two years. As an example, half the caterpillars transforming into the chrysalis stage July 7, 1935, emerged May 8, 1936; the other half remained, hatching May 13, 1937.

This beautiful *Papilio* is smaller than the giant swallow-tail, *Papilio cresphontes*. The wings are black-brown with yellow markings. Underneath there is a broad band of rich dark maroon. On the hind wings are a series of metallic lunules. The tails are straight and of even width. The species has a short life. With one exception my specimens were all taken during May and June.

The conclusion that this rare insect was restricted to the small area on Lower Matecumbe Key was at first founded on the fact that I believed that the host plant was also confined to that small area. The Key was swept by a furious hurricane and tidal-wave in early September, 1935, which wrecked and destroyed the flora. So I set about to search the surrounding islands, and found the torchwood growing rather abundantly on a number of Keys lying in that region, and farther north. This forced me to abandon my belief that the limited area in which we found the butterfly was governed by the distribution of the host plant. I have, however, made a diligent search over the entire area where the host plant is growing, and I am convinced that our butterfly is absent from these regions. I have sought the butterfly, the eggs and the larvae. I have hunted them under all kinds of weather conditions and from early dawn until sunset, without success.

The fury of the 1935 hurricane is plainly visible from Key Largo south. Mangrove trees, tough warriors for the land in its eternal fight with the sea, have been twisted like tissue paper and cropped close. Vegetation of all types has been whipped to shreds. Valuable hammock land is desolate. Wild life species peculiar to the Keys undoubtedly perished in large numbers.

Hesitant as I am to conclude that here, too, *Papilio ponceana* made its last stand, when the sand dune and beautiful hammock melted away under the fury of hurricane and tidal wave, I fear it is true. Lower Matecumbe, long a naturalist's paradise with its exotic plants and children of the sun, is like a stricken animal, panting at bay ere it dies. Matecumbe, indeed, is a "place of sorrow."

A.O.U. Meeting

Dr. James P. Chapin of New York was elected president of the American Ornithologists' Union at its 1940 meeting in September. The vice-presidents are George Willett, Los Angeles, and Dr. J. L. Peters, Cambridge, Massachusetts. Dr. Lawrence E. Hicks of Columbus, Ohio, is secretary, and Rudyerd Boulton of Chicago, treasurer. The Brewster Medal Award was made to Dr. James L. Peters for his four volumes published to date of *The Birds of the World*. The 1941 meeting will be held in Denver in September.

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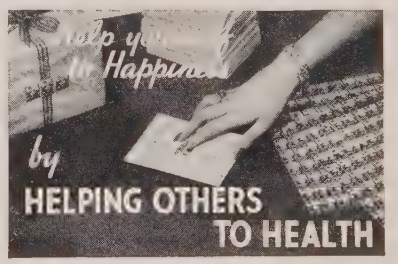

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